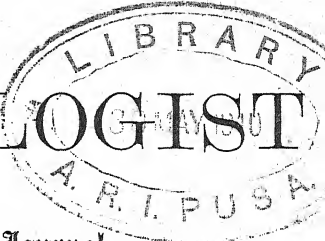




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Despatches from New Orleans state that “thousands of acres of sugar and cotton in Louisiana will go to waste for lack of labourers.”

Complete railway communication between Adelaide and Brisbane, except the break—which is to be made good—by the bridge over the Hawkesbury, will be effected on March 31st, next.

A telegram dated 3rd December last has been received from Sir R. B. D. Morier, Her Majesty's Ambassador at St. Petersburg, to the effect that the payment of bounties closed on the 1st July last on all sugar except that exported to Central Asia. This year's crop will therefore receive no bounty.

In a recent report of the United States' Consul at Crefeld occurs this passage referring to beet calculation in Germany,—an extract from the report we give at page 17:—

“Farmers are, however, growing wise by experience, for they have learned that the conversion of their sugar beet crops into beef is a much more profitable transaction than selling them for sugar purposes at present prices; and the result will be probably an advance in the price of sugar during the next two or three years.”

An interesting discussion on the sugar trade of the United States has recently taken place at Boston. Mr. C. O. Foster, sugar refiner, delivered the opening address, and in alluding to the domestic sugar industry, asks “After the experience of the past twenty years, in trying to foster domestic production, is it not

time that the refining interests, and the consumers', should receive some consideration in the shape of the abolition or reduction in the duties on foreign raw sugars? "

At page 40 we give a report of the meeting.

It is now supposed that the Mauritius sugar crop will be less than last year's by 15,000 tons. Various statements are made touching the Cuba crop, some speak of it as likely to be larger than on any previous year, viz., 800,000 tons, whilst others put it down at not over 600,000 tons. (Last crop was 692,681 tons.)

We see by the *Sugar Bowl and Farmer* of December 18th, that the sorghum works at Rio Grande (New Jersey) where, for several years, the manufacture of sugar from sorghum has been carried on, have been closed, and all the employées discharged. They have been bolstered up by a bounty from the State, but last year Governor Abbott vetoed the bounty bill. The bounty was one dollar, paid by the State to the farmer, for every ton of sorghum out of which crystallized sugar has actually been obtained, and a further bounty of one cent per lb. (4s. 8d. per cwt.) to the manufacturer for each pound of sugar so made. (See *Sugar Cane* for 1884, page 140.)

The Royal Commissioner (Sir Hercules Robinson) has been reluctantly compelled to suspend the Governor of Mauritius upon various grounds, but chiefly because he was convinced that Sir J. Pope Hennessy had occasioned a breach between classes and nationalities, which was not likely to heal while he remained, and that it would be prejudicial to the Queen's service for him (Sir H. Robinson) to depart leaving Sir J. P. Hennesey administering the Government. General Hawley is now acting as Governor pending instructions, and Mr. Round as Colonial Secretary. It is expected Sir J. P. Hennessy will leave the island this January.

The imports of beet-sugar at New York from January 1st to December 14th are reported to be 115,855 tons, against 74,860 tons in 1885.

The Dutch Government Bills affording temporary assistance to the sugar industry in Java, are meeting with serious opposition in the Bureaux of the Second Chamber. The proposed measures are considered inadequate for the purpose, and the majority of the deputies are opposed to an artificial protection, demanding instead a reduction of taxes and the removal of the restrictions, which at present weigh upon the industry.

1886.

Disastrous to our sugar planters as were the years 1884 and 1885, we fear that to most of them the results of the year 1886 will have proved more disastrous still,—the average price of raw sugar for the past year being 2s. per cwt. below that of either 1884 or 1885.

Great reductions have in many instances been effected in the working expenses, and, where our planters have been able to command the means, improvements have been introduced in the manufacturing processes, and in this way some saving has been made in the cost of production; the crops too, in most cases, have been favourable; still, taking planters all round, their condition at the end of 1886, must be worse than at the commencement.

There are planters we know who have gone through these three years, if not making a profit all the time, without loss; but their estates have been favourably situated, well managed, and *unencumbered*; just as there are German beet-sugar companies which, for 1885-86, are able to show fairly satisfactory profits, whilst the bulk of them show losses, or profits so small as scarcely to be reckoned.

The following table shows the average prices of 88% beet-sugar f.o.b. for each quarter of the year for the past five years:—

	1882.	1883.	1884.	1885.	1886.
First Quarter.....	21/6 ..	20/- ..	17/1 ..	11/5 ..	13/7½
Second „	22/9 ..	21/3 ..	14/7½ ..	14/6 ..	12/1½
Third „	22/3 ..	20/7 ..	13/6 ..	15/2 ..	11/1½
Fourth „	20/3 ..	18/9 ..	10/6½ ..	14/9½ ..	10/9
Average for the whole } Year.....	21/7½ ..	20/1½ ..	13/11 ..	13/11½ ..	11/10½

The question: “At what price can Continental beet sugar manufacturers continue to export without loss?” is still an open one. We have before us a calculation made by one who is an authority upon matters connected with sugar, which goes to show that after deducting the drawback, the Germans can produce it at 5s. 9d. per cwt. This is the calculation:—

7 cwt. roots required for 1 cwt. sugar.

Cost of roots per cwt.	M. 0·80	
„ working „	0·45	9s. per ton.
Duty, per cwt.	0·85	

1 cwt. roots cost .. M. 2·10

1 cwt. of sugar or 7 cwt. of manufactured	
roots cost.	14·70
Deduct drawback	9·0

Cost of 1 cwt. of sugar M. 5·70 or nearly 5s. 9d. per cwt.

That this is entirely wide of the mark, is clearly shown by the balance sheets of the German sugar companies for the past campaign, viz., from 1st August, 1885, to 31st July, 1886, when the average price of 88 per cent. f.o.b. was 14s. A large number of these companies show losses, and others profits so small as scarcely to be considered, though there are some companies which show much more favourably; still, taking them all through, it is a question whether the result will reach 5 per cent. upon the capital employed, and this, too, with prices 3s. per cwt. higher than to-day's. True, that in the present campaign these companies will work upon a reduced cost of roots, and with some increase in the percentage of sugar obtained—making, however, a liberal allowance for this, it does not appear to us that at 11s. for 88% f.o.b. the German factories, as a whole, can hold their own.

What course prices will take it is impossible to say. We commence the New Year with reduced stocks in first hands, and it is generally thought that the stocks in the hands of the refiners and retailers are unusually light, the practice of hand to mouth buyer having largely prevailed. On the other hand, the prospect of early and large supplies precludes the hope of any material improvement upon present values, unless brought about by an European disturbance; so that so far as our planters are concerned, it would seem scarcely safe for them to build upon a price much above present quotations. It is not a pleasant look out, but such we fear may prove to be the fact.

A great deal of attention has lately been, and is being given by our planters to improvements and new processes, whereby the cost of production can be lessened. In our numbers for February and March last year, we gave a report of the experiments made in Java in 1885, with the diffusion process. Whilst the results obtained were so far satisfactory as to make it very desirable that the experiments should be repeated upon a much larger scale, they cannot be considered as conclusive. As Mr. Paton pithily puts it in his short but cautionary paper on "Diffusion and Fuel" (*Sugar Cane*, May, 1886, page 229), "Planters are more anxious to make money than to make sugar, consequently the whole matter hinges on the question 'Will it pay?'"

We are glad to see that Mr. Quintin Hogg is about to put the diffusion process, as applied to the sugar cane, to a thorough test on his estate "Nonpareil," Demerara; the plant, it is expected, will be ready for work about May, and we may rest assured that neither money nor intelligence will be wanting to make it, if possible, a success.

It must prove a very decided success to justify a planter, with modern machinery, to throw aside his crushing mill as old metal, in order to put down a diffusion plant; the comparison should be with mills doing good work, giving 70 per cent. and upwards of juice.

Sugar from sorghum, or "The Sorghum Craze," is again to the front in the United States. It may serve the present purpose of those members of Congress who are strong protectionists, and interested parties, to hold up this industry as having a great future before it, if only the present duties on sugar are continued; but this will be all. At page 20 of the present number will be found a History of the Sorghum Sugar Industries in the United States, sent to our Foreign Office by our representative at Washington. It is little more than a record of repeated failures. In it Dr. Collier, the famous sorghum enthusiast, is spoken of as having retired some years since from the position of Chemist to the Department of Agriculture, "*the Commissioner having no further need for his services*," and further on it states that "Mr. Stewart is not considered to be an authority on "whose statements reliance should be placed in connection with the "question of the sorghum sugar industry."

The enormous surplus which the United States' revenue shows year by year, gives good ground for the hope that at an early day some important reductions in the duties will be effected; and when this time arrives, there is no doubt that sugar will be one of the articles first dealt with, seeing that nine-tenths of the sugar consumed in the States is imported from abroad. A movement is now on foot, and receiving considerable support, in favour of the entire abolition of the sugar duties, and of giving a bounty to the domestic producers—we presume equal in amount to the duty now charged—in other words, the importers would have no longer to pay to the United States Government £10,000,000 annually in duties, but the Government will have to pay, say, £1,000,000 yearly to its own producers of sugar, as a reward for their inability to compete with the rest of the world.

If such a measure came to be passed, it would be heartily welcomed

by our West India colonies, for it would go a long way in restoring them to their former state of prosperity.

As it is, in spite of the present excessive duties,—about 80 per cent. *ad valorem*—the United States consume more sugar than any other country in the world; the increase during the past five years being more than a quarter of a million of tons. And if we compare the present consumption with what it was ten years ago, we find it has nearly doubled. With free sugars this rate of increase would be greatly enhanced.

Nearly the whole of the sugars consumed in the States are cane sugars, whereas nearly one half of the sugar consumed in this country is made from bounty-fed beet.

The year, which has just closed, has been a very trying one for our refiners, and would have been more so but for the fact that the works of our largest refiner in London have been closed during the greater part of the year, which has made it somewhat better for those who continued working.

In the early part of the year, in consequence of the large bounties given by the Russian Government, we received large supplies of Russian refined. These bounties have for the present ceased, as have also the imports. The United States Government have recently reduced the amount of drawback upon the exportation of sugar, leaving the bounty at about 1s. per cwt. in the place of 2s., and the probability is that the shipments of American refined to this country will be greatly diminished.

Our refiners, are, however, now confronted with a much more formidable rival in France. The French Sugar Law of June, 1884, has led to an enormous increase in the French production, with the result that we shall have 150,000 tons of French refined thrown upon this market during the present year. The loss to the French Treasury by this extravagant bounty granting law, is so serious, that an early alteration is looked upon as certain—the mischief, however, so far as this market is concerned, is done—these 150,000 tons will have to be shipped, and any change in the law will be merely transferring the loss from the French Treasury to the French fabricants.

Austria will also have a surplus of 150,000 tons, for which a market outside of her own empire will have to be found.

The sugar record for 1886 is not a satisfactory one, and the immediate prospects are far from cheering.

THE PRESENT AND FUTURE PROSPECTS OF THE CANE SUGAR AND OTHER AGRICULTURAL INDUSTRIES IN TRINIDAD.

BY JAMES L. O'CONNOR,

*Chairman of the District Agricultural Board of the Naparima
Ward Union.*

The great struggle which for many years past has been going on between the beet and cane sugar industries, and which has recently not only reduced to an alarming extent the public revenue, but now even threatens to sweep away an industry to which the colony owes the high position it has attained among the British possessions in this part of the world, is my excuse for submitting this paper to your consideration. But I must in the first place crave the indulgence of the planting body if my criticisms should appear to them to be rather severe. No one can doubt the fact that if their position has become so critical, it is due neither to a want of intelligence nor energy on their part, but in a great measure to circumstances beyond their control, which, however, may be so altered as to operate favourably in restoring their prosperity.

It is hardly necessary to enter here into the various causes which have brought about the great depression in the sugar market, but I shall endeavour to show how it should be met, and what chances there are of competing successfully with an adversary which can hardly become more formidable than it is at present, owing to the fact that the great intellects engaged in promoting its success appear to have almost reached the limits of scientific researches bearing on its production, and it is indeed fortunate that such is not the case with the cane sugar industry, otherwise there would be no alternative than its entire abandonment.

In glancing over the history of the past, what do we find? That although the producers of beet sugar have been progressing with gigantic strides towards the attainment of a rapid decrease in the cost of production, we have been moving onward it is true towards the same end, but only at what may not be inaptly termed a snail's pace.

The following figures will, I think, fully bear out my statement, and show at the same time the extraordinary results brought about by the introduction in the beet industry of the diffusion system which

it cannot be doubted will produce still greater results when adopted in connection with the manufacture of cane sugar.

Crop.	GERMANY.					
	Tons Beet per Acre.	Production Sugar Tons.	Percentage usine with diffusion.	Ton Sugar per 100 tons Beet.	Ton Beet required for 1 Ton Sugar.	Ton Sugar per Acre.
1871	8.1	186,441	16.7	8.28	12.07	0.67
1872	10.2	262,551	19.5	8.26	12.11	0.84
1873	10.9	291,041	23.7	8.25	12.12	0.90
1874	8.3	256,412	34.0	9.30	10.75	0.97
1875	11.3	358,048	47.3	8.60	11.60	0.97
1876	10.1	289,422	60.0	8.15	12.47	0.82
1877	11.0	378,009	68.0	9.24	10.82	1.02
1878	11.6	426,155	80.0	9.21	10.86	1.07
1879	10.1	409,415	88.7	8.52	11.74	0.86
1880	13.1	555,915	90.3	8.79	11.37	1.15
1881	11.8	644,775	94.0	9.56	10.46	1.32
1882	13.8	848,124	94.0	9.55	10.47	1.35*
1883	11.9	986,402	95.5	10.54	9.42	1.25
1884	11.3	1,154,417	96.0	....	....	....
1885	12.1	852,000	97.0	....	....	....
1886	....	900,000	97.5	....	....	....

* 100 per cent. more sugar per acre than in 1871 and 1872.

Austria, 1886, Diffusion 212 usines: equal to 95 per cent. Other process 11 usines.

France, 1886, about 75 per cent. of all usine work with diffusion.

The difficulties by which the cane sugar producers are hampered, and which threaten him with ruin, do not appear to be unsurmountable, neither are the measures to be adopted in order to revive the industry on a more solid basis impracticable, but the difficulty to be apprehended will probably be found in the hesitation and unreasonable objections that may be raised by the timorous as to the remedial agencies to be adopted.

In the first place the subject of a proper supply of labour is of paramount importance, and the sacrifices to be made to render such labour remunerative must not be overlooked.

In by-gone years, during a long period of great depression caused by the low prices of sugar and the scarcity of labour, the expediency of encouraging by every reasonable means a resident peasantry on the sugar estates was attended with very satisfactory results, and was seldom overlooked. Many inducements were held out to the labourer to reside on the estate on which his services were required. He was

generally provided with suitable house accommodation, and sometimes free medical attendance, and some land was allotted to him to cultivate provisions. He was even allowed, when found to be very steady and industrious, to rear stock. It can readily be imagined that such privileges were a great inducement to many to establish themselves and their families permanently on the estates, and cost the proprietors very little. Time has shown whether the gradual withdrawal of those privileges was a wise measure. They were, no doubt, discontinued in order to extend cultivation, which it would have been more prudent to restrict, and increase by superior tillage the return from the land. Some of the labourers became settlers on crown lands, while the greater number removed to the neighbouring villages, where inducements to lead an intemperate and idle life led to an increase of pauperism and crime. As the price of food increased, by the discontinuance to cultivate ground provisions, and owing probably to the improved state of the sugar market, the labourer's pretensions to higher wages naturally increased, and the practice of paying higher wages to nonresident labourers became general, but has recently and very properly been discontinued, as being most impolitic.

Whatever sacrifices it may be deemed necessary to make with the view of encouraging a large resident peasantry on the sugar estates, it cannot be doubted that the benefit which would arise from such sacrifices would amply compensate the planter, and there is reason to believe that while some of our creole labourers might be induced to become resident labourers, thousands of labourers now in the neighbouring islands, where the distress among them seems to be increasing daily, would be glad to avail themselves of an offer to settle here if a liberal scheme were devised, satisfying the immigrants that their condition would be improved by making Trinidad their home.

The introduction also of a system of tenant farmers, wherever practicable, would help very much towards improving the condition of the labouring classes, while it would prove equally beneficial to the proprietor of sugar estates. But in order to insure success such schemes as suggested must be well matured, for it is no easy matter to conciliate interests, which, although apparently conflicting, are nevertheless identical; and when it is considered that the welfare of two classes, the employers and the employed, are involved, a policy which will tend to produce mutual concessions and inspire mutual confidence cannot be too strongly advocated.

In considering the question of remunerative labour, it is very important not to lose sight of the fact that it cannot be obtained with the prevailing low prices of sugar in the absence of cheap food for the people, and it can hardly be doubted that the suggestions just made if carried out will tend much towards reducing the price of food.

A good supply of labour alone, however, will not suffice to restore the prosperity of the sugar cane planter, although it will help him on considerably. The sharp competition that now prevails necessitates thorough reforms in the modes of culture, while the manufacturing appliances must comprise the latest improvements, and it is to be hoped that the present depression will be viewed with a keen appreciation of what has been done in older countries towards reducing the cost of production.

The agricultural resources of the colony are great, yet comparatively little indeed is done towards improving them. It is a fact that while the best British soils now bear four times the crop they bore a few centuries ago—and this is due to improved tillage—our soils have been considerably deteriorated by defective tillage, but not exhausted as supposed by some planters, for referring to this subject, Messrs. Wall and Sawkins, in their very able report on the geology of Trinidad, page 117, state that—"The term exhausted has been employed as usual in the colony, but it is highly objectionable, as soils which have been worked fifty years may be more productive and more remunerative if properly operated than others which are only just brought under cultivation."

It is also a fact that manures are imported yearly from different countries at no small expense and applied to our cane fields, while no attention is paid to their preparation on a large scale from local resources, which are allowed to waste, and here again let me quote from the same report the following observations and advice which will bear out my statement, and, it is to be hoped, prove interesting to those who may read this paper:—

"It has been customary to attempt to ward off exhaustion by the application of expensive imported manures. The following suggestions for supplying the essential substances more cheaply, and equally perhaps more efficiently, may be useful, especially since the deposits of guano are described as diminishing in consequence of the enormous quantities which are annually carried away. Phosphoric acid and phosphate of lime by the introduction of crushed bones, or if collected

in the colony to be crushed before application, mixed with sulphuric acid and allowed to digest some time, this latter process frees the former acid and renders it available for the plant. Carbonate of potash and sulphate of ammonia in small quantities would afford the necessary alkalis. These substances with the application of lime, already referred to, would supply the mineral matter of the cane.

“The principle of extending the area under canes to the utmost limits and producing the last hogshead possible, seems to be far too exclusively pursued, and the question of reduced cost of production to be effected by superior systems of cultivation and manufacture almost entirely neglected, and yet the latter is not only the most promising course of procedure to secure the colony from disaster in the case of further competition with cheaper grown produce, but it may be predicted would initiate an entirely new era in its industrial history.”

Although Messrs. Wall and Sawkins wrote the above extracts 26 years ago, they are still applicable to the present state of agriculture in the colony, and although more attention is now paid to improved modes of culture, and some improvements have been effected in manufacturing appliances, yet the results as to the cost of production show that much remains to be done. The importance of a cheap supply of fuel, a heavy item of expenditure in the manufacture of sugar, and one which will be considerably increased by the adoption of the diffusion system, appears as a rule to be disregarded, so far at least as the procuring of it from local resources is involved. Large shipments of coals and patent fuel come across the ocean yearly—a distance of 4,000 miles, while it is well known that important carbonaceous deposits exist in different parts of the island, and one not further than a mile from this town on the “Vista Bella” estate, at about half a mile from the government railway. No serious action has ever been taken towards developing the resources of such valuable mineral fuels. On the other hand, thousands of uncultivated acres that could be made to produce at an inconsiderable outlay an abundant supply of bamboos for fuel are neglected.

There are other products necessary to the maintenance of the cane sugar industry which it is the practice to import from other countries, such as oats and oil meal, and which might very well be substituted by Indian corn and corn meal, products which by the exercise of a little extra trouble could be supplied by the planter

himself at a comparatively small expenditure. But as there are sometimes certain interests at jar with those of the planter which unfortunately have to be satisfied to his detriment, this circumstance has probably operated towards the neglect of the minor industries in connection with the cane cultivation.

The production of a crop of about 1300 tons of sugar means an expenditure for oats and oil-meal alone for the stock of some \$10,000, and although a moderate outlay would suffice to produce from the estate lands, the necessary amount of grain and meal, leaving a large profit to the proprietor, yet the experiment has not been made, we are satisfied to continue in the old groove, and fear to free ourselves from old prejudices.

The heavy losses hitherto sustained by the use of antiquated and defective machinery and appliances can no longer be tolerated if those interested in the cane sugar industry expect to compete successfully with the producers of beet sugar. The age in which we live does not admit of any hesitation, which, under present circumstances, would be fatal to the former industry. The return of beet per acre in Germany is about 12 tons, which yield about $1\frac{1}{2}$ tons of sugar of a quality very inferior to our vacuum pans, and the total cost varies from £8 to £11 per ton.

With the best machinery here now in use (the average number of tons of canes per acre being about 20), the yield of vacuum pan sugar per acre may be computed at about $1\frac{3}{4}$ tons. But by improving the modes of culture, and thereby increasing the yield from 20 to 26 tons of canes per acre, and even over, and by substituting the diffusion process with all the recent improvements for our mills and copper walls, an increase to three tons of superior vacuum pan sugar per acre may fairly be anticipated, with the result of a diminution in the actual cost of production of at least 25 per cent., while effecting a considerable improvement in quality. And let me ask, under such circumstances, can anyone now doubt that a new era of prosperity is opening for the cane sugar producer if he can only manage to secure the necessary capital to take advantage of the great scientific improvements in machinery and manufacturing appliances of recent years, which prove beyond a doubt that no plant can yield sugar at as great a profit as the sugar cane; for the diffusion system is now an accomplished fact. The defects which at one time existed have vanished before the scientific researches of those who, from the very beginning,

predicted for it a bright future. The cane slicing machines have now been brought to great perfection, and everything else connected with the process.

Referring to this subject, the following extract from an article by Mr. Edmond Riffard, an eminent authority on such matter, will bear out my statement as to the relative value of the cane and beet:—
“En présence de ces faits la sucrerie indigène betteravière a le droit d'envier l'industrie coloniale. Nous n'approuvons pas d'avantage les récriminations de ces derniers car ils sont les maîtres de la situation si tant est que leur volonté de suivre le progrès soit bien arrêté.”

As a native of the colony, and as one who has always taken the liveliest interest in its prosperity, I cannot refrain from referring here to the recent formation by His Excellency Sir William Robinson of District Agricultural Boards. The great interest which His Excellency continues to take in their success is a pledge of his earnestness to develop every branch of our agricultural resources, and secure for the country that measure of prosperity which it is beginning to lack, and which as a rule is enjoyed in agricultural communities with similar institutions.

The Liberal policy of the present Government towards agricultural industries in general is such as to justify the belief in the revival on a sound and permanent basis of the cane sugar industry, while products which are now included among minor industries will, in a few years hence, form no insignificant part of our exports.

The policy of the mother country is so much opposed to protection that it is unreasonable to expect any relief which would involve the necessity for a change of that policy. But adversity, which is as severe, is also at times a useful teacher, and if I may be allowed to predict the future from the past history of the country, it is not unreasonable to expect that the great sugar crisis, by which all classes of the community are more or less affected, will in due time give way to a more prosperous state of things which will be brought about by a more general observance of the relations of science to agriculture, and by the prompt and decisive action of those capitalists who have already such large investments in the colony; for if results based on scientific principles are to be depended upon, no one can any longer doubt that, to use the words of Mr. Edmond Riffard, quoted above, the cane sugar producers are now masters of the situation.

So far as we are concerned, the question seems to resolve itself to

this, that considering the special advantages, situation, climate, fertility of soil, &c., possessed by Trinidad, if the necessary capital to permit of the introduction of more scientific methods of culture, and at the same time the most approved modern appliances, be brought to bear on the cane sugar, as has been the case with the beet sugar industry, the result must be a complete victory for the former. And, under present circumstances, it may be asked, what are the agricultural industries that offer to capitalists a safer investment than that of the cane sugar in this colony, and in some of the neighbouring colonies enjoying the same advantages of climate, stability of the Government, and absence from popular commotions.

Possibly the struggle that has been going on between the two great industries for many years on very unequal terms may have somewhat, in certain localities, reduced the chances in favour of carrying on the cane sugar industry successfully by private enterprise. But the remedy in such cases seems to be a simple one, viz., the formation of joint stock companies. The immunity from losses, so far as human foresight can be relied upon, and the large dividends such companies would enjoy, cannot, I think, be doubted in the presence of such facts as have been, I trust, satisfactorily proved in this paper.

USINE, OR CENTRAL PLANTATION SUGAR FACTORIES.

Havana, November 10th, 1886.

TO THE EDITOR OF "THE SUGAR CANE."

Dear Sir,—The interesting article published by the *Sugar Cane* in the issue of October 1st, written by Mr. Neville Lubbock, encourages me to give you some information on the same subject from this island of Cuba, where for the last five years, this system has taken large and wide proportions.

As explained by the heading of these lines, the french *usine* sugar system, originally put into practice at Martinique and Guadeloupe by Mr. Cail, is nothing else but what is known through this island as central plantation sugar factories.

The causes that created or originated this system here, are numerous, but are probably more or less the same that has encouraged the system in other sugar producing countries. I will, however, mention the following causes for Cuba: abolition of slavery, high wages exacted by free labouring hands, steady unremunerative sugar

prices, embarrassed financial condition of planters, bad management, and unimproved machinery used at the sugar plantations. It may be added: the destruction and abandonment of many plantations during the ten years civil war, and the heavy taxes exacted by the Government on all plantations during the war.

The natural consequence of all the above-named causes, gave as a result, that small unimproved plantations could not and cannot subsist, and have been gradually absorbed by the large and improved neighbouring ones. Coloured or white labouring men have taken charge of the cultivation of the lands by small lots, through contracts made with the landowners, generally of demolished estimates. A head of a family, say of four working members, will take charge of the care and cultivation of about 35 acres of land. Two-thirds of the land must be devoted to sugar cane, and the balance for farming for their private convenience. When the crop time arrives, the factory or sugar-house owner, will pay his client at the rate of $4\frac{1}{2}$ arrobes, or 1 cwt. of sugar made for each cart load of 2,500 lbs. sound cane delivered at the grinding mill, conductor, or receiver. If the landowner agreed to provide his client with food and working implements, then the contracts vary accordingly, say $3\frac{1}{2}$ arrobes of sugar, in payment of the 2,500 lbs. cane delivered.

It often happens that those small cane planters do not care to handle the sugar made, and prefer selling at once the cane to the factory owner, generally under the basis of \$2.50, or 10 shillings per every cart load weighing net 2,500 lbs. sound cane, delivered at the grinding mill, conductor, or receiver. The price for the cane, as a rule, goes up and down during the crop season, in sympathy with the sugar market.

The above statement gives an accurate idea of the way said business is generally carried on in Cuba.

Small factories or sugar houses, or estates, with unimproved machinery offer no inducements to the named cane planters. Consequently a central plantation, besides being owned by a gentleman of fair financial standing, must be provided at least with a double effet vacuum pan and centrifugal machinery capable of turning out over 30 hhds. sugar per day.

One hhd. of sugar weighing net 1,500 lbs., is, on an average, considered to be the production of 1,000 arrobes or 25,000 lbs. sound cane. In some localities, 800 arrobes cane may deliver 1 hhd. sugar, and in others it takes 1,200 arrobes cane to make the 1 hhd. sugar.

When a central plantation pays for the cane received, delivering sugar as an equivalent, it is always understood to be at least clarified or centrifugal sugar. The centrifugal molasses sugar and the molasses left over, is kept by the central plantation owner, for account of grinding and manufacturing expenses.

I will here make reference to a very important point, not thoroughly understood by many. Chemists, land-nursers, experts, professional agriculturists, and scientific men are exceedingly scarce here, and if we put aside a few praiseworthy exceptions, those which we have had have ruined and discredited the profession, making costly experiments, which have ended with disastrous failures; and now they are generally looked upon here with much suspicion, even by those that truly need their services. Practical scientific agriculturists and sugar makers are much needed through the island, and until a sufficient and adequated force, with endorsements of successfulness shall be had, our planters will continue largely, following the worn-out routine systems inherited from our ancestors.

The "usine," or central sugar plantation is a great improvement widely extending through this island, and undoubtedly it is the main principle by which Cuba has been able to go through all the vicissitudes mentioned above, without diminishing the amount or bulk of her sugar production, a thing that no other country on earth has been able to do, where wealth and prosperity was based on slavery. It is said that during the last 15 years over 300 sugar plantations have been demolished in this island; but when have we ever seen here a central plantation like the "Constancia," near Cienfuegos, that made a crop of 16,032 hhds. centrifugal sugar, and expects to turn out next year 20,000 hhds. It is true that this immense estate made no money out of this enormous crop, but that is accounted for by the exceedingly low sugar prices prevailing all over. Central plantations making from 5,000 to 10,000 hhds. sugar per crop, may in our days be counted up by the dozen through this island.

Now, if the question should be put to me, of: how long will this last? I could give no answer, as the unremunerative sugar prices prevailing make all figures hazardous. It must earnestly be said, that the salvation of the sugar industry in tropical countries, depends upon the United States abolishing or diminishing her import duties on sugars.

I am, very respectfully,

W. I. PLANTER.

CONDITION OF AGRICULTURAL INDUSTRIES IN GERMANY.

The following particulars respecting the general condition of the agricultural industries in Germany have been extracted from a recent report by the United States Consul at Orefeld :—

“The business of farming in Germany has been for some years and is now in a depressed and very unsatisfactory condition. This fact is particularly apparent in the prevailing low value of farms as compared with previous years. It is said by those who are in a position to be well informed upon the subject, that in districts which are remote from large cities, and where the consumption of milk and other perishable farm products is small, that farming properties can be purchased for 50 per cent. of their former value.

“Farmers who purchased their farms at the high prices of previous years, especially those prevailing after the German-French War of 1870-71, and who paid in full for them, have sunk, it is said, half of the capital thus invested. That larger class of farmers who purchased their land at about the same dates, making small payments in cash, and giving heavy mortgages as security for balances due, have suffered still more severely.

“The chief reason named as the cause of this downward tendency in the value of farms, which is still unchecked, and the continued impoverished condition of the middle-class farmers, are the unusually low prices, steadily maintained in all the markets of the country, for grain and cattle; and these depressed prices, it is said, have been brought upon the country in consequence of the immense importations from Russia, America, and the English East Indies of similar articles of food.

“Many intelligent farmers mention, as one of the causes of agricultural depression, the operations of the German agrarian laws, which, they say, do not favour as much as they ought to do, the general farming interests of the country, and refer especially to existing provisions, according to which, children inheriting farm estates have the right to claim a division of the land, and require their respective shares to be set off for their separate use. The result naturally is, that if the heirs avail themselves of their rights and insist upon such division of the land into equal parts, the share apportioned to each is

generally too small for their separate support; or, in case one heir should purchase the entire estate, he is obliged to place a mortgage upon it in order to raise the money necessary to settle with joint heirs, and in this way generally assumes burdens heavier than he can support, and a following consequence is, in a large majority of cases, the money-lenders or speculators who hold the mortgages foreclose, and, by usual legal processes, take possession of the estate.

“ In this manner, it is stated, a surprisingly large number of farms fall into the hands of speculators, who either divide the land into small holdings for tenants, or combine several farms into one large tract, which is sold to capitalists, and they, in turn, rent the land to tenants, who, through careless management, allow it to depreciate in value and yield, and thus deprive the country of the natural abundance which the land is capable of producing.

“ As a consequence, it is by some apprehended that, in the absence of appropriate legislation upon the subject (but what kind of remedial legislation is not suggested), the middle-class farmers will, sooner or later, disappear, and their lands gradually pass into the possession of comparatively few and wealthy owners, as in England and Ireland.

“ It is also alleged by some energetic defenders of the farming interests that the manufacturing industries of the country have been better protected by legislation than the agricultural industries.

“ The Imperial Government have during the last two or three years carefully investigated the numerous complaints of farmers, and are now doing all that seems reasonable and possible for the agricultural classes, and the work of the Imperial Chancellor, who has been especially active in their behalf, appears to have been highly appreciated and gratefully acknowledged by farming communities. The prohibition of the importation of some articles of food, and the increased duties provided for others, does not, however, appear up to the present date to have benefited the farmers in a direct way, as the pressure of low prices upon agriculture still continues. But the new tariff law provides that a certain portion of the income from such increased import duties shall be paid over to certain district authorities for the benefit of farmers, and such sum is credited on their tax bills. In this manner they are indirectly benefited by the increased duties on food products.

“The sugar manufactories are mostly in the hands of companies which control large amounts of capital, and only a few establishments are in possession of agricultural associations. Up to the present date the Government has refunded to the manufacturers the entire duties collected on export sugar, and for this reason their dividends have been large; but farmers who produce the beets do not seem to have been benefited by this liberal measure, as the price of sugar beets has been tending steadily downward.

“Farmers are, however, growing wise by experience, for they have learned that the conversion of their sugar-beet crops into beef, by feeding them to cattle, is a much more profitable transaction than selling them for sugar purposes at present prices, and the result will be probably an advance in the price of sugar during the next two or three years.

“The most recent measure proposed in the interests of farmers, is what is termed the ‘schnapps’ or brandy ‘monopoly.’ Nearly all large farms have small brandy distilleries connected with them. There are also many small farms that are in some way connected with such distilleries, and their number would be much larger if they were able to compete with the wealthier and larger producers. There are extensive districts of light sandy soil in Germany, especially in East Prussia, which produce immense quantities of potatoes, that are consumed in the manufacture of ‘schnapps’ or brandy.

“In localities containing better soil, this article is made from grain, fruits, and grape skins, the latter producing the best quality of brandy.

“For the people who inhabit districts of country that are marshy and ill-drained, the Imperial Government have provided liberal assistance by constructing and maintaining systems of efficient drainage. In mountainous localities forests have also been planted.

“It is noticeable throughout Germany that scientific and modern methods of cultivating the soil are rapidly superseding past usages, and that the business of farming is being conducted upon the basis of higher intelligence and business-like principles.”

HISTORY OF THE SORGHUM INDUSTRY OF THE UNITED STATES.

The following Report, which forms a history of the Sorghum Industry of the United States, compiled by Mr. C. Hardinge, has been forwarded to our Foreign Office by our Representative at Washington, Sir L. S. S. West, under date October 5, 1886:—

REPORT ON THE SORGHUM INDUSTRY OF THE UNITED STATES.

In reply to Mr. Thiselton Dyer's comments on Mr. Drummond's report respecting the extraction of sugar from sorghum and maize, and in explanation of certain statements made therein and questioned by Mr. Thiselton Dyer, Mr. Norman Colman, Commissioner of the Department of Agriculture at Washington, states that Mr. Drummond's information has been gained from limited sources, and the facts upon which he has based his conclusions are apparently those derived from the laboratory experiments and opinions of Dr. Peter Collier, formerly Chemist of the Department of Agriculture, and do not take into consideration the results of practical experience in the country, and experiments conducted by the department in the field during the past few years, under the direction of Dr. H. Wiley, at present in charge of this subject.

A considerable time has already elapsed since Professor Collier retired from his position as Chemist of the Department of Agriculture, the Commissioner having no further need of his services; and Mr. Stewart is not considered to be an authority on whose statements reliance should be placed in connection with the question of the sorghum sugar industry.

With regard to the following statement in Mr. Drummond's report, which Mr. Thiselton Dyer declares to be "quite incomprehensible as a scientific deduction from facts," and to require further elucidation, viz., "It is only after the seed of any variety of sorghum is quite mature that the maximum of sugar in the stalks is attained, so that there is nothing to prevent the securing of both the maximum of seed and the maximum of sugar from the (same) crop of sorghum"—Mr. Norman Colman asserts that it has been definitely settled, both by experiment and practice, that a full crop of seed is not only incompatible with a large yield of sugar, but that full maturity is necessary to obtain the largest yield. On the other hand, Mr. Norman Colman characterises Mr. Stewart's claims in regard to controlling the vital energies of the growing plant as "certainly extravagant and hardly worthy of consideration."

As to the extent to which this industry has been developed, the extraction of marketable sugar from sorghum and maize has not yet assumed actual commercial importance, the entire production of the past 10 years in the

United States not having exceeded, in the opinion of the Statistician of the Department of Agriculture, 5,000,000lbs. (2232 tons.)

There were in 1884 several factories engaged in the extraction of crystallised sugar from sorghum and maize, and the following is a résumé of the results obtained by them, as reported to the Commissioner of Agriculture at Washington:—

The sugar factory at Hutchinson, Kansas, was one of the best equipped in the country, and in 1883 the services of Professor Swanson, of the Wisconsin University, well known for his ability in connection with this question, were secured as superintendent. The result of the season's work was 200,000lbs. of sugar, which was heralded in Kansas as the solution of the sorghum sugar question. The facts, however, were that the cost of production was far in excess of the receipts, and the company became bankrupt. In 1884 another effort was made, with the result of 250,000lbs. of sugar, but again at a heavy loss in cost of production. The report of the Hutchinson Sugar Works for 1884 is as follows:—

1. Acres of cane worked (100 for syrup only, 700 for syrup and sugar)	800
2. Tons of cane worked	6,100
3. Amount of seed (estimated)	10,000 bushels.
4. Amount of sugar made.. .. .	250,000 lbs.
5. Amount of syrup made.. .. .	50,000 gallons.
6. Average yield of sugar per ton of cane worked for sugar	47 lbs.
7. Average yield of syrup per ton of cane	7 gallons.
8. Average yield of sugar per acre	357 lbs.
9. Average yield of syrup per acre	53 gallons.
10. Value of plant	50,000 dol.
11. Number of hands employed during season (10 hours per diem)	22
12. Wages paid	1 dol. 50 c.
13. Fuel used (coal) per ton	5 dol.
14. Commenced milling	Aug. 22.
15. Closed milling	Oct. 30.
16. Cost of raising and delivering cane at factory, per ton	1 dol. 50 c.
17. Amount of juice expressed	40 per cent.
18. Working capital required	20,000 dol.

And Professor Swanson, in a letter to the Commissioner of Agriculture, dated the 12th September, 1884, makes the following statement:—"Under the present low prices the sorghum sugar industry is barely able to hold its own, but if, under favourable legislation, prices can be advanced from $\frac{1}{2}$ c.

1 c. per lb., or if State or national aid to a like amount can be obtained for a limited time, till the best machinery can be procured and the methods of manufacture perfected, under these conditions we may safely hope to see the sorghum sugar industry established on a sound basis, and adding very materially to the wealth and prosperity of the country."

The works of the Sterling Sugar Company are at Sterling, Kansas, and in 1883 a new company was formed, with Professor Scovell as superintendent. In spite of every possible reduction in the cost of production, the season of 1884 resulted in heavy losses for the company, chiefly due to the extremely low price of sugar; and it was decided not to run the factory again unless a great improvement showed itself in the market. The following is Professor Scovell's report of the operations of the sugar-works at Sterling:—

1. Acres of cane manufactured	1000
2. Tons of cane manufactured.. .. .	7100
3. Price paid for cane delivered, per ton	2 dol.
4. Cost of production of cane, not estimating seed, per ton	1 dol. 57 c.
5. Seed not yet gathered, but will yield 15 to 30 bushels per acre.	
6. Amount of sugar made	169,000 lbs.
7. Amount of syrup made	75,000 gallons.
8. Value of manufacturing plant	80,000 dol.
9. Number of hands employed	50 to 60.
10. Wages paid, per hour.. .. .	15 c.
11. Cost of making sorghum cane into sugar and syrup per ton.. .. .	1 dol. 10 c.
12. Amount of juice expressed.. .. .	50 to 60 per cent.
13. Percentage of feed furnished by bagasse.. ..	66 $\frac{2}{3}$ per cent.
14. Date of commencement of milling	September 1st.
15. Date of close.. .. .	October 31st.
16. Working capital required	20,000 dol.

The works of the Franklin Sugar Company at Ottawa, Kansas, which had been thoroughly overhauled, and made into a well-equipped sugar factory, under the management of Mr. Parkinson, showed the following results for the season of 1884:—

1. Acres of cane manufactured	600
2. Tons of cane manufactured	6100
3. Price paid for cane, per ton	2 dol.
4. Amount of seed.. .. .	1600 bushels.
5. Yield of sugar per ton of cane	30 lbs.
6. Yield of syrup per ton of cane	5 gallons.
7. Value of plant	60,000 dol.

8. Number of hands employed (12 hours per <i>diem</i>)..	75
9. Wages of hands, per hour	14 c.
10. Fuel used (coal) per ton	3 dol. 35 c.
11. Commenced milling.. .. .	September 1st.
12. Closed milling	November 6th.
13. Amount of juice expressed	40 per cent.
14. Working capital required	20,000 dol.

Thus, in the State of Kansas, which, from the nature of the soil and the temperature of the climate, has been shown to be especially adapted for the profitable prosecution of sugar industry, a summary of the operations of the three largest sugar factories gives the following results :—

1. Number of factories operating for sugar	3
2. Capital invested in plant	190,000 dol.
3. Working capital	60,000 dol.
4. Number of hands employed	152
5. Average daily wages of hands, nearly.. ..	1 dol. 50 c.
6. Amount of sugar made	602,000 lbs.
7. Amount of syrup made	155,500 gals.
8. Acres of cane worked	2400
9. Tons of cane worked	19,300
10. Value of cane worked	38,600 dol.

The sugars were sold at 5c. to 6 $\frac{3}{4}$ c. per lb. wholesale, and the syrups at 15c to 30c. per gallon wholesale.

The Champaign Sugar Company, whose works are at Champaign, Illinois, made in 1884 100,000lbs. of sugar; but having sustained very severe losses, and sunk all the money invested, they concluded that they would not attempt to make any more sugar.

Mr. William Fraser, of Esofea, a Vernon county, Wisconsin, being a careful operator, and with only a small centrifugal for sugar making, succeeded in producing 1000lbs. of sugar during the season of 1884, and made his factory pay a fair profit by making 5000 gallons of syrup, which were sold to the home market at 40c. per gallon.

Mr. Joseph Porter, of Red Wing, Minnesota, with a model factory for ingenuity of machinery, made 2500lbs. of sugar and 6000 gallons of syrup, and, by selling his syrup at 35c. to 50c. per gallon, succeeded in making his mill a paying investment.

Mr. John Stuart, of Traer, Iowa, succeeded in producing from seven acres seven tons of cane per acre from which, by a process of artificial evaporation, he produced 4900lbs. of sugar.

Messrs. Drummond, of Wanensburg, Missouri, and Messrs. Belcher and Swartz, of Edwardsville, Illinois, make now only syrup, having but small

hopes that the manufacture of sugar of sorghum can be made a profitable business.

The Rio Grande Company, at Rio Grande, New Jersey, exported 385,000lbs. of sugar, but no record has been obtained. This is also said to be a company whose business is a losing one.

Of all the above-mentioned factories, where in 1884 the extraction of sugar from sorghum was carried on, there exist at the present date only two where this industry is being prosecuted—one being that of the Rio Grande Company, and the second that of the Franklin Sugar Company, whose works have been removed from Ottawa to Fort Scott, where experiments are still being made under the superintendence of Dr. Wiley.

The amount of sugar made from sorghum during the season of 1884 may thus be safely based upon the following report:—

Name of Company.						Lbs.
Hutchinson Sugar Company,	Kansas	..	..	..	..	250,000
Kansas	„	„	Sterling	..	..	175,000
Franklin	„	„	Ottawa	..	..	183,000
Champaign	„	„	Illinois	..	..	100,000
Mr. Fraser, Esofea,	Wisconsin	..	..	..	..	1,000
Mr. Porter, Redwing,	Minn...	..	..	..	..	2,500
Mr. Stuart, Traer,	Iowa	..	..	..	..	4,900
Rio Grande (exported)	..	..	..	..	..	385,000

making, roughly speaking, rather more than 1,000,000lbs. in all.

By comparing this quantity of sugar derived from sorghum, with the annual consumption of cane sugar in the United States, viz., 1,170,000 tons (this being the quantity consumed in 1885), the fact is patent to all that this industry has not yet assumed “actual commercial importance;” and Mr. Thiselton Dyer’s conclusion “that the production of good crystallisable sugar from sorghum to such an extent, and at such prices as to compete successfully with cane sugar remains to be seen,” is essentially correct, although in the opinion of the Commissioner of Agriculture great hopes are to be entertained for the future of the industry.

From a study of the foregoing data of the operations in the field during the season of 1884, the only conclusion to be drawn is that the manufacture of sugar from sorghum has not proved hitherto successful. Great results were predicted, but the expectations of the least enthusiastic advocates of sorghum have not been realised, leaving the future of this industry still a matter of doubt. In the opinion of Dr. Wiley this state of things is due to many causes, of which the following are the most evident:—

1. The difficulties inherent in the plant have been constantly undervalued. By taking the mean of several seasons as a basis of computation, it can now be said that the juices of sorghum, as they come from the mill, do not

contain over 10 per cent. of sucrose, while the percentage of other solids in solution is at least four, thus rendering the working of such a juice one of extreme difficulty.

2. The chemistry of the process is at present hardly known, and great development is necessary in this direction.

3. The area of land, where the climate and soil are best adapted for the cultivation of sorghum, is not nearly so extensive as was at first imagined, and investigation should be made in order to discover in which localities the necessary conditions are most favourable.

4. Commercial depression and the consequent low prices have affected this industry, and caused failure and losses in cases where all other conditions were favourable.

5. Lastly, the mechanical treatment of the juice is very imperfect, the machinery used in the mills being quite inefficient for the purposes intended.

With a view to the correction of the last-mentioned defect, it was decided by the Commissioner of Agriculture to apply the appropriation made by Congress to conducting experiments for the application of the process of diffusion on a practical scale. These experiments, although at first intended to take place in the season of 1884, had, owing to the difficulty of obtaining suitable machinery, to be postponed till the following year.

Dr. Wiley was entrusted with the direction of the experiments, and having obtained the best machinery possible, and erected the battery and necessary buildings in connection with the works of the Franklin Sugar Company at Ottawa, Kansas, the first trial of the process of diffusion was made on the 8th October, 1885. The cutters were at work from 8 a.m. until 5 a.m. of the following day. The weight of the diffused juice from 65 cells, capable of holding 1400lbs. each, was 96,140lbs. The exhausted chips on analysis showed 0.10 per cent. of glucose, while the waste waters of diffusion showed 0.10 per cent. of sucrose and 0.10 per cent. of glucose, thus making the loss of sugar 0.10 per cent. of sucrose, and 0.20 per cent. of glucose, or a total loss of 0.30 per cent. This, in Dr. Wiley's opinion, was a very satisfactory result, and makes it appear that diffusion can be successfully practised with sorghum cane, when the weight of the juice obtained is made about the same as that of the cane diffused. The mean specific gravity of the 32 charges, of 700 litres, each drawn from the first series of 32 cells, was 1.0394 at 25°, or at 15° 1.0411, corresponding to 10.24 per cent. total solids. The average specific gravity of the juice of 32 charges, of 600 litres, each drawn from the second series of cells, was 1.0405 at 25° or 1.0424, corresponding to 10.55 per cent. total solids. Owing to the great variation in the composition of the cane, no estimate of the degree of extraction could be made from the analysis of the cane juices.

The following analyses were made of the diffusion juices during the day :—

Articles.	First time, 10-30 a.m.	Second time. 3 p.m.
Total solids	10·84	9·70
Glucose	2·32	2·00
Sucrose	6·19	5·90
Solids not sugar	2·33	1·80

The weight of coal used during the diffusion amounted to $1\frac{1}{2}$ tons, but half of this quantity might have been saved if the chips could have been promptly removed from the cells, so as to render it possible to make a diffusion every 10 minutes, in which case the whole experiment might have been completed in less than twelve hours.

The necessary force required and the expense incurred was:—

	Dol.	c.
One fireman (day) and one (night) at 1 dol. 50 c.	3	00
Four men on cane carrier (day) and four (night) at 1 dol. 25 c.	10	00
Four men at battery (day) and four (night) at 1 dol. 25 c.	10	00
One team to remove chips (day) and one (night) at 2 dol. 50c.	5	00
One valve-man (day) and one (night) at 2 dol. 25 c.	4	50
One and a half tons of coal at 3 dol. 25 c.	4	88
Oil and lights	1	00
One boy (to sweep, &c.)	0	75
Total cost of diffusing 49 tons of cane	38	13

With some changes in the construction of the battery, and especially an enlargement of the cells, this rate of expense could be very much reduced, and the cost of diffusing a ton of cane would not exceed 30c. It was estimated that about 15 horse-power was used in driving the machinery and heating the cells.

A careful estimate of the number of tons of the juice which was worked showed that 15 had been carbonated.

This yielded 4320lbs. of "masse cuite," containing 76·9 per cent. solid matter, or 11 per cent. on weight of cane worked.

The following analysis shows the composition of this "masse cuite":—

	Per cent.
Sucrose	53·48
Glucose	13·55
Water	23·10
Ash	4·74
Not sugar	5·13

The "masse cuite" was allowed to stand one week, and yielded 1420lbs., or about 30 per cent., of washed and dried sugar, or 95lbs. per ton of cane worked.

Allowing 12lbs. per gallon for the "masse cuite," the number of gallons per ton of cane was 24.

The sugar was of fine quality—the molasses of much better quality than

that obtained in the usual way—and the whole product was in every way satisfactory.

Experiments were also made in carbonatation by the process so successfully used with beet juices. The process is simple, and consists in adding to the expressed juice a large excess of lime, and afterwards precipitating the greater part of it with carbonic acid. The whole is then sent to the filter press, where the precipitated carbonate of lime and impurities are separated from the juice. Owing to a large per-centage of glucose in sorghum juice, the process is not conducted in the same manner as with beet juices.

On experimenting with the diffusion juices mentioned above, it was found that about $1\frac{1}{2}$ per cent. of lime was sufficient to produce perfect defecation; and in one day about 40,000 lbs. of juice were carbonated, with most satisfactory results. The juice came from the filter-press perfectly limped, and of a delicate amber colour. After passing through a sulphur box, this juice was sent to the evaporators, and reduced to a "masse cuite," which in colour, purity, and taste was greatly superior to the best product obtained by the usual method.

The carbonatation of sorghum juice, however, demands the greatest care. If too little lime is added, the precipitate does not settle readily, and filtration is slow and imperfect. The carbonatation must be continued until all but 0·2 per cent. of the lime has been removed. If more than this remains, the juice will darken and become bitter on boiling. If less than this quantity is left, the impurities appear to be redissolved, and a green scum forms on the top of the still liquor instead of sinking with the precipitate. With the help of proper test reagents, a little experience will enable the operator to carry the carbonatation to a successful completion.

It was found, also, that the temperature during carbonatation should not be allowed to exceed 40° C. Directly the carbonatation is completed, the juice is raised as rapidly as possible to the boiling-point, and sent at once to the filter-press. If allowed to stand, the liquor will quickly darken. Foaming is prevented by the addition of a little lard to the sugar, and by jets of steam from a perforated pipe near the top of the pan.

In all, 100,000 lbs. of juice were carbonated, and Dr. Wiley asserts that this process of defecation offers every evidence of being the one which should be brought into general use. In large sugar factories the saving in scums alone would pay for the carbonatation plant.

The mean coefficient of purity of the juices worked by the Franklin Sugar Company is 61·3, and Dr. Wiley stated his belief that by proper culture, fertilising, and selection, sorghum cane could be produced in which the juices would have a coefficient of purity of 75 to 80. The importance of securing such a cane is even greater than that of extracting all the sugar and properly defecating the juice.

The general results of the experiments of 1885 showed that:—

1. By the process of diffusion 98 per cent. of the sugar in the cane was extracted, and the yield was fully double that obtained in the ordinary way.
2. The difficulties to be overcome in the application of diffusion are purely mechanical, and by enlarging the diffusion cells to a capacity of 130 cubic feet, and by making a few changes in the apparatus, it would be possible to work 120 tons per diem.
3. The process of carbonatation for the purification of the juice is the only method which will give a limpid juice with a minimum of waste and a maximum of purity.
4. By a proper combination of diffusion and carbonatation, 95 per cent. of the sugar in the cane can be placed on the market, either as dry sugar or molasses.

At the termination of the foregoing experiments, Dr. Wiley received instructions from the Commissioner of Agriculture to proceed to Europe, for the purpose of inspecting and purchasing such forms of machinery as might appear most useful, also to gain such information as might secure the greatest success in this work; and much useful information, chiefly of a mechanical nature, was obtained by Dr. Wiley during the course of his visits to several of the most important sugar factories in France, Germany, and Spain.

During the present season of 1886 further experiments are being carried on at Fort Scott, under the direction of the Department of Agriculture; and it is reported that the results have not proved to be as satisfactory as was anticipated.

The foregoing account has been derived from information supplied by the Department of Agriculture, and shows the present phase of the sorghum sugar industry, as requested by Mr. Thiselton Dyer.

THE SUGAR INDUSTRY IN JAVA.

The Second Chamber of the States General held a sitting at the Hague, December 16th, at which a final discussion was taken upon the ministerial proposals for the relief of the sugar industry in Java. It was resolved that the tax on free cultivation should be temporarily remitted, and that a delay of five years should be granted in respect of one half of the payments due by the manufacturers having contracts with the Government. It was also decided that the export duty on Java sugar should be remitted for five years.

GERMAN SUGAR COMPANIES, CAMPAIGN 1885-86.*

The following particulars are taken from the *Deutsche Zucker-industrie*, of 10th and 17th December, 1886:—

The Friedensau Sugar Manufactory closed its balance sheet up to the 31st July, with a loss on its year's transactions, in spite of all the efforts of the directors, amounting to M. 203,658, of which about M. 70,000, is attributable to the fall in prices, and about M. 100,000 to the slight difference between raw and refined sugars, so that the cost of manufacture could not be covered, the remainder being loss on farming operations.

The Münsterberg Factory shows a loss of M. 119,006, which added to the loss brought forward from last year makes the amount to the bad to be carried forward to new account M. 339,711.

The Mannheim Refinery, which gained in the campaign 1884-85 M. 147,555, has lost in 1885-86 M. 108,844, owing to the constant depreciation of refined sugars.

The Starch Sugar (Glucose) Manufacturing Company, at Frankfort-on-the-Oder, will pay a dividend of 10 per cent.

The Baden Sugar Manufacturing Company, which brought forward from 1884-85 a credit balance of M. 12,630, has lost in 1885-86 M. 228,335. They have three establishments, Waghäusel, Altshausen, and Züttlingen. At the close of the report they say:—"Finally we will take a short glance at the new campaign. Unfortunately this presents no delightful picture. It is true that the beets which are being worked up are of satisfactory quality, and will exceed last year's quantity by about 50 per cent., and hence, in spite of the greater burden inflicted by the advance of 10 pfgs. in the beet tax, there is a well-founded hope that the cost price of our own raw sugar will be lower, but it must be regarded as questionable whether at the extreme low value (about M. 39½ on the basis of 96%) this will still leave a profit. How far the refining will produce satisfactory results, is in the nature of things also uncertain; however in consideration of the universal scarcity in stocks of refined goods, and also in the expectation of steadily increasing exports, the hope of better trade during the present campaign does not seem unjustifiable."

The Bahnhof Marienburg Sugar Manufactory lost M. 13,304 on last year's working, and M. 51,794 on stock, which added to the deficit of 1884-85 makes M. 144,912 to the bad for two year's operations.

The Immendorf Sugar Manufacturing Company pays a dividend of 9 per cent.

The First Silesian Pilé Refinery shows a loss of M. 92,893.

The Mewe Sugar Manufacturing Company and the Kleischkan Factory (Silesian) have called their creditors together.

* See also pages 396, 450, 505, 561, and 618 of the *Sugar Cane*, for 1886.

CUBAN GIVEN SUGAR PRICES IN DOLLARS AND CENTS WITH

Cts. $\frac{1}{2}$ lb.	Cts. $\frac{1}{2}$ kilog.	Cts. $\frac{1}{2}$ Miriag.	Rls. fts. $\frac{1}{2}$ @ = Cts. $\frac{1}{2}$ 25lbs.	Cts. $\frac{1}{2}$ Qt. = 28lbs.	$\frac{1}{2}$ 99=100lbs.	$\frac{1}{2}$ cwt.* = 112lbs.
0 $\frac{1}{8}$	0.13	1.36	$\frac{1}{8}$ 01.56 $\frac{1}{4}$	01 $\frac{3}{4}$	06 $\frac{1}{2}$	07
0 $\frac{1}{4}$	0.27	2.72	$\frac{1}{4}$ 03.12 $\frac{1}{2}$	03 $\frac{1}{2}$	12 $\frac{1}{2}$	14
0 $\frac{3}{8}$	0.54	5.44	$\frac{3}{8}$ 06.25	07	25	28
0 $\frac{1}{2}$	0.81	8.16	$\frac{1}{2}$ 09.37 $\frac{1}{2}$	10 $\frac{1}{2}$	37 $\frac{1}{2}$	42
0 $\frac{5}{8}$	1.08	10.88	1 12.50	14	50	56
0 $\frac{3}{4}$	1.35	13.60	1 $\frac{1}{4}$ 15.62 $\frac{1}{2}$	17 $\frac{1}{2}$	62 $\frac{1}{2}$	70
0 $\frac{7}{8}$	1.62	16.32	1 $\frac{3}{8}$ 18.75	21	75	84
0 $\frac{1}{1}$	1.89	19.64	1 $\frac{3}{4}$ 21.87 $\frac{1}{2}$	24 $\frac{1}{2}$	87 $\frac{1}{2}$	98
1	2.17	21.76	2 25.00	28	1.00	1.12
1 $\frac{1}{8}$	2.34	24.48	2 $\frac{1}{4}$ 28.12 $\frac{1}{2}$	31 $\frac{1}{2}$	1.12 $\frac{1}{2}$	1.26
1 $\frac{1}{4}$	2.71	27.20	2 $\frac{1}{2}$ 31.25	35	1.25	1.40
1 $\frac{3}{8}$	2.98	29.92	2 $\frac{3}{4}$ 34.37 $\frac{1}{2}$	38 $\frac{1}{2}$	1.37 $\frac{1}{2}$	1.54
1 $\frac{1}{2}$	3.25	32.64	3 37.50	42	1.50	1.68
1 $\frac{5}{8}$	3.52	35.36	3 $\frac{1}{4}$ 40.62 $\frac{1}{2}$	45 $\frac{1}{2}$	1.62 $\frac{1}{2}$	1.82
1 $\frac{3}{4}$	3.79	38.08	3 $\frac{3}{8}$ 43.75	49	1.75	1.96
1 $\frac{7}{8}$	4.06	40.80	3 $\frac{3}{4}$ 46.87 $\frac{1}{2}$	52 $\frac{1}{2}$	1.87 $\frac{1}{2}$	2.10
2	4.34	43.52	4 50.00	56	2.00	2.24
2 $\frac{1}{8}$	4.61	46.24	4 $\frac{1}{4}$ 53.12 $\frac{1}{2}$	59 $\frac{1}{2}$	2.12 $\frac{1}{2}$	2.38
2 $\frac{1}{4}$	4.88	48.96	4 $\frac{1}{2}$ 56.25	63	2.25	2.52
2 $\frac{3}{8}$	5.15	51.68	4 $\frac{3}{4}$ 59.37 $\frac{1}{2}$	66 $\frac{1}{2}$	2.37 $\frac{1}{2}$	2.66
2 $\frac{1}{2}$	5.42	54.40	5 62.50	70	2.50	2.80
2 $\frac{5}{8}$	5.69	57.12	5 $\frac{1}{4}$ 65.62 $\frac{1}{2}$	73 $\frac{1}{2}$	2.62 $\frac{1}{2}$	2.94
2 $\frac{3}{4}$	5.96	59.84	5 $\frac{1}{2}$ 68.75	77	2.75	3.08
2 $\frac{7}{8}$	6.23	62.56	5 $\frac{3}{4}$ 71.87 $\frac{1}{2}$	80 $\frac{1}{2}$	2.87 $\frac{1}{2}$	3.22
3	6.51	65.28	6 75.00	84	3.00	3.36
3 $\frac{1}{8}$	6.78	68.00	6 $\frac{1}{4}$ 78.12 $\frac{1}{2}$	87 $\frac{1}{2}$	3.12 $\frac{1}{2}$	3.50
3 $\frac{1}{4}$	7.05	70.72	6 $\frac{1}{2}$ 81.25	91	3.25	3.64
3 $\frac{3}{8}$	7.32	73.44	6 $\frac{3}{8}$ 84.37 $\frac{1}{2}$	94 $\frac{1}{2}$	3.37 $\frac{1}{2}$	3.78
3 $\frac{1}{2}$	7.59	76.16	7 87.50	98	3.50	3.92
3 $\frac{5}{8}$	7.86	78.88	7 $\frac{1}{4}$ 90.62 $\frac{1}{2}$	1.01 $\frac{1}{2}$	3.62 $\frac{1}{2}$	4.06
3 $\frac{3}{4}$	8.13	81.60	7 $\frac{1}{2}$ 93.75	1.05	3.75	4.20
3 $\frac{7}{8}$	8.40	84.32	7 $\frac{3}{4}$ 96.87 $\frac{1}{2}$	1.08 $\frac{1}{2}$	3.87 $\frac{1}{2}$	4.34
4	8.68	87.04	8 100.00	1.12	4.00	4.48
4 $\frac{1}{8}$	8.95	89.76	8 $\frac{1}{4}$ 103.12 $\frac{1}{2}$	1.15 $\frac{1}{2}$	4.12 $\frac{1}{2}$	4.62
4 $\frac{1}{4}$	9.22	92.48	8 $\frac{1}{2}$ 106.25	1.19	4.25	4.76
4 $\frac{3}{8}$	9.49	95.20	8 $\frac{3}{8}$ 109.37 $\frac{1}{2}$	1.22 $\frac{1}{2}$	4.37 $\frac{1}{2}$	4.90
4 $\frac{1}{2}$	9.76	97.92	9 112.50	1.26	4.50	5.04
4 $\frac{5}{8}$	10.03	100.64	9 $\frac{1}{4}$ 115.62 $\frac{1}{2}$	1.29 $\frac{1}{2}$	4.62 $\frac{1}{2}$	5.18
4 $\frac{3}{4}$	10.30	103.36	9 $\frac{1}{2}$ 118.75	1.33	4.75	5.32
4 $\frac{7}{8}$	10.57	106.08	9 $\frac{3}{4}$ 121.87 $\frac{1}{2}$	1.36 $\frac{1}{2}$	4.87 $\frac{1}{2}$	5.46
5	10.85	108.80	10 125.00	1.40	5.00	5.60
5 $\frac{1}{8}$	11.12	111.52	10 $\frac{1}{4}$ 128.12 $\frac{1}{2}$	1.43 $\frac{1}{2}$	5.12 $\frac{1}{2}$	5.74
5 $\frac{1}{4}$	11.39	114.24	10 $\frac{1}{2}$ 131.25	1.47	5.25	5.88
5 $\frac{3}{8}$	11.66	116.96	10 $\frac{3}{4}$ 134.37 $\frac{1}{2}$	1.50 $\frac{1}{2}$	5.37 $\frac{1}{2}$	6.02
5 $\frac{1}{2}$	11.93	119.68	11 137.50	1.54	5.50	6.16
5 $\frac{5}{8}$	12.20	122.40	11 $\frac{1}{4}$ 140.62 $\frac{1}{2}$	1.57 $\frac{1}{2}$	5.62 $\frac{1}{2}$	6.30
5 $\frac{3}{4}$	12.47	125.12	11 $\frac{1}{2}$ 143.75	1.61	5.75	6.44
5 $\frac{7}{8}$	12.74	127.84	11 $\frac{3}{4}$ 146.87 $\frac{1}{2}$	1.64 $\frac{1}{2}$	5.87 $\frac{1}{2}$	6.58
6	13.02	130.56	12 150.00	1.68	6.00	6.72

* It should be understood that an English cwt. = 112lbs. is only 110 $\frac{1}{2}$ Spanish lbs., and that said 1 $\frac{1}{2}$ lbs. difference has not been taken into consideration in figuring the above statement.

CORRESPONDING SPANISH, ENGLISH, AND FRENCH GIVEN WEIGHTS.

$\frac{1}{2}$ 100 kilog. = 217lbs.	Sack, Bag, or or Bbl. = 300lbs.	$\frac{1}{2}$ Box. 400lbs. net.	$\frac{1}{2}$ Hhd. = 1,500lbs. net.	$\frac{1}{2}$ Ton = 2099 2,000lbs. net.	$\frac{1}{2}$ Ton = 20 cwt. 2,240lbs. net.	$\frac{1}{2}$ Ton = 1,000 kilog. 2,176lbs. net.
13 $\frac{1}{6}$	18 $\frac{3}{4}$	25	93 $\frac{3}{4}$	1.25	1.40	1.36
27 $\frac{1}{2}$	37 $\frac{1}{2}$	50	1.87 $\frac{1}{2}$	2.50	2.80	2.72
54 $\frac{1}{2}$	75	1.00	3.75	5.00	5.60	5.44
81 $\frac{1}{2}$	1.12 $\frac{1}{2}$	1.50	5.62 $\frac{1}{2}$	7.50	8.40	8.16
1.08	1.50	2.00	7.50	10.00	11.20	10.88
1.35	1.87 $\frac{1}{2}$	2.50	9.37 $\frac{1}{2}$	12.50	14.00	13.60
1.62	2.25	3.00	11.25	15.00	16.80	16.32
1.89	2.62 $\frac{1}{2}$	3.50	13.12 $\frac{1}{2}$	17.50	19.60	19.04
2.17	3.00	4.00	15.00	20.00	22.40	21.76
2.34 $\frac{1}{2}$	3.37 $\frac{1}{2}$	4.50	16.87 $\frac{1}{2}$	22.50	25.20	24.48
2.71	3.75	5.00	18.75	25.00	28.00	27.20
2.98	4.12 $\frac{1}{2}$	5.50	20.62 $\frac{1}{2}$	27.50	30.80	29.92
3.25	4.50	6.00	22.50	30.00	33.60	32.64
3.52	4.87 $\frac{1}{2}$	6.50	24.37 $\frac{1}{2}$	32.50	36.40	35.36
3.79	5.25	7.00	26.25	35.00	39.20	38.08
4.06 $\frac{1}{2}$	5.62 $\frac{1}{2}$	7.50	28.12 $\frac{1}{2}$	37.50	42.00	40.80
4.34	6.00	8.00	30.00	40.00	44.80	43.52
4.61 $\frac{1}{2}$	6.37 $\frac{1}{2}$	8.50	31.87 $\frac{1}{2}$	42.50	47.60	46.24
4.88 $\frac{1}{2}$	6.75	9.00	33.75	45.00	50.40	48.96
5.15	7.12 $\frac{1}{2}$	9.50	35.62 $\frac{1}{2}$	47.50	53.20	51.68
5.42 $\frac{1}{2}$	7.50	10.00	37.50	50.00	56.00	54.40
5.69	7.87 $\frac{1}{2}$	10.50	39.37 $\frac{1}{2}$	52.50	58.80	57.12
5.96	8.25	11.00	41.25	55.00	61.60	59.84
6.23	8.62 $\frac{1}{2}$	11.50	43.12 $\frac{1}{2}$	57.50	64.40	62.56
6.51	9.00	12.00	45.00	60.00	67.20	65.28
6.78 $\frac{1}{2}$	9.37 $\frac{1}{2}$	12.50	46.87 $\frac{1}{2}$	62.50	70.00	68.00
7.05 $\frac{1}{2}$	9.75	13.00	48.75	65.00	72.80	70.72
7.32 $\frac{1}{2}$	10.12 $\frac{1}{2}$	13.50	50.62 $\frac{1}{2}$	67.50	75.60	73.44
7.59	10.50	14.00	52.50	70.00	78.40	76.16
7.86	10.87 $\frac{1}{2}$	14.50	54.37 $\frac{1}{2}$	72.50	81.20	78.88
8.13	11.25	15.00	56.25	75.00	84.00	81.60
8.40	11.62 $\frac{1}{2}$	15.50	58.12 $\frac{1}{2}$	77.50	86.80	84.32
8.68	12.00	16.00	60.00	80.00	89.60	87.04
8.95 $\frac{1}{2}$	12.37 $\frac{1}{2}$	16.50	61.87 $\frac{1}{2}$	82.50	92.40	89.76
9.22	12.75	17.00	63.75	85.00	95.20	92.48
9.49	13.12 $\frac{1}{2}$	17.50	65.62 $\frac{1}{2}$	87.50	98.00	95.20
9.76 $\frac{1}{2}$	13.50	18.00	67.50	90.00	100.80	97.92
10.03	13.87 $\frac{1}{2}$	18.50	69.37 $\frac{1}{2}$	92.50	103.60	100.64
10.30	14.25	19.00	71.25	95.00	106.40	103.36
10.57	14.62 $\frac{1}{2}$	19.50	73.12 $\frac{1}{2}$	97.50	109.20	106.08
10.85	15.00	20.00	75.00	100.00	112.00	108.80
11.12 $\frac{1}{2}$	15.37 $\frac{1}{2}$	20.50	76.87 $\frac{1}{2}$	102.50	114.80	111.52
11.39 $\frac{1}{2}$	15.75	21.00	78.75	105.00	117.60	114.24
11.66	16.12 $\frac{1}{2}$	21.50	80.62 $\frac{1}{2}$	107.50	120.40	116.96
11.93	16.50	22.00	82.50	110.00	123.20	119.68
12.20	16.87 $\frac{1}{2}$	22.50	84.37 $\frac{1}{2}$	112.50	126.00	122.40
12.47	17.25	23.00	86.25	115.00	128.80	125.12
12.74 $\frac{1}{2}$	17.62 $\frac{1}{2}$	23.50	88.12 $\frac{1}{2}$	117.50	131.60	127.84
13.02	18.00	24.00	90.00	120.00	134.40	130.56

* In the same way it should be mentioned that the actual difference of weights, Spanish, English, and French, has not been here accounted for. The difference is so small that the Spanish lb. is taken at par in making out the English and French equivalents.

CUBAN GIVEN SUGAR PRICES IN DOLLARS AND CENTS WITH

Cts. $\frac{1}{2}$ lb.	Cts. $\frac{1}{2}$ kilog.	Cts. $\frac{1}{2}$ Miriag.	Rls. fts. $\frac{1}{2}$ @ = Cts. $\frac{1}{2}$ 25lbs.	Cts. $\frac{1}{2}$ Qt. = 28lbs.	$\frac{1}{2}$ 99 = 100lbs.	$\frac{1}{2}$ cwt.* = 112lbs.
0 $\frac{1}{6}$	0.13	1.36	$\frac{1}{2}$ 01.56 $\frac{1}{2}$	01 $\frac{3}{4}$	06 $\frac{1}{2}$	07
0 $\frac{1}{4}$	0.27	2.72	$\frac{1}{2}$ 03.12 $\frac{1}{2}$	03 $\frac{1}{2}$	12 $\frac{1}{2}$	14
0 $\frac{1}{2}$	0.54	5.44	$\frac{1}{2}$ 06.25	07	25	28
0 $\frac{3}{4}$	0.81	8.16	$\frac{1}{2}$ 09.37 $\frac{1}{2}$	10 $\frac{1}{2}$	37 $\frac{1}{2}$	42
0 $\frac{5}{8}$	1.08	10.88	1 12.50	14	50	56
0 $\frac{7}{8}$	1.35	13.60	$1 \frac{1}{2}$ 15.62 $\frac{1}{2}$	17 $\frac{1}{2}$	62 $\frac{1}{2}$	70
0 $\frac{1}{2}$	1.62	16.32	$1 \frac{1}{2}$ 18.75	21	75	84
0 $\frac{3}{4}$	1.89	19.64	$1 \frac{1}{2}$ 21.87 $\frac{1}{2}$	24 $\frac{1}{2}$	87 $\frac{1}{2}$	98
1	2.17	21.76	2 25.00	28	1.00	1.12
1 $\frac{1}{4}$	2.34	24.48	$2 \frac{1}{2}$ 28.12 $\frac{1}{2}$	31 $\frac{1}{2}$	1.12 $\frac{1}{2}$	1.26
1 $\frac{1}{2}$	2.71	27.20	$2 \frac{1}{2}$ 31.25	35	1.25	1.40
1 $\frac{3}{4}$	2.98	29.92	$2 \frac{3}{4}$ 34.37 $\frac{1}{2}$	38 $\frac{1}{2}$	1.37 $\frac{1}{2}$	1.54
1 $\frac{5}{8}$	3.25	32.64	3 37.50	42	1.50	1.68
1 $\frac{7}{8}$	3.52	35.36	$3 \frac{1}{2}$ 40.62 $\frac{1}{2}$	45 $\frac{1}{2}$	1.62 $\frac{1}{2}$	1.82
1 $\frac{1}{2}$	3.79	38.08	$3 \frac{1}{2}$ 43.75	49	1.75	1.96
1 $\frac{3}{4}$	4.06	40.80	$3 \frac{3}{4}$ 46.87 $\frac{1}{2}$	52 $\frac{1}{2}$	1.87 $\frac{1}{2}$	2.10
2	4.34	43.52	4 50.00	56	2.00	2.24
2 $\frac{1}{4}$	4.61	46.24	$4 \frac{1}{4}$ 53.12 $\frac{1}{2}$	59 $\frac{1}{2}$	2.12 $\frac{1}{2}$	2.38
2 $\frac{1}{2}$	4.88	48.96	$4 \frac{1}{2}$ 56.25	63	2.25	2.52
2 $\frac{3}{4}$	5.15	51.68	$4 \frac{3}{4}$ 59.37 $\frac{1}{2}$	66 $\frac{1}{2}$	2.37 $\frac{1}{2}$	2.66
2 $\frac{5}{8}$	5.42	54.40	5 62.50	70	2.50	2.80
2 $\frac{7}{8}$	5.69	57.12	$5 \frac{1}{2}$ 65.62 $\frac{1}{2}$	73 $\frac{1}{2}$	2.62 $\frac{1}{2}$	2.94
2 $\frac{1}{2}$	5.96	59.84	$5 \frac{1}{2}$ 68.75	77	2.75	3.08
2 $\frac{3}{4}$	6.23	62.56	$5 \frac{3}{4}$ 71.87 $\frac{1}{2}$	80 $\frac{1}{2}$	2.87 $\frac{1}{2}$	3.22
3	6.51	65.28	6 75.00	84	3.00	3.36
3 $\frac{1}{4}$	6.78	68.00	$6 \frac{1}{4}$ 78.12 $\frac{1}{2}$	87 $\frac{1}{2}$	3.12 $\frac{1}{2}$	3.50
3 $\frac{1}{2}$	7.05	70.72	$6 \frac{1}{2}$ 81.25	91	3.25	3.64
3 $\frac{3}{4}$	7.32	73.44	$6 \frac{3}{4}$ 84.37 $\frac{1}{2}$	94 $\frac{1}{2}$	3.37 $\frac{1}{2}$	3.78
3 $\frac{5}{8}$	7.59	76.16	7 87.50	98	3.50	3.92
3 $\frac{7}{8}$	7.86	78.88	$7 \frac{1}{4}$ 90.62 $\frac{1}{2}$	1.01 $\frac{1}{2}$	3.62 $\frac{1}{2}$	4.06
3 $\frac{1}{2}$	8.13	81.60	$7 \frac{1}{2}$ 93.75	1.05	3.75	4.20
3 $\frac{3}{4}$	8.40	84.32	$7 \frac{3}{4}$ 96.87 $\frac{1}{2}$	1.08 $\frac{1}{2}$	3.87 $\frac{1}{2}$	4.34
4	8.68	87.04	8 100.00	1.12	4.00	4.48
4 $\frac{1}{4}$	8.95	89.76	$8 \frac{1}{4}$ 103.12 $\frac{1}{2}$	1.15 $\frac{1}{2}$	4.12 $\frac{1}{2}$	4.62
4 $\frac{1}{2}$	9.22	92.48	$8 \frac{1}{2}$ 106.25	1.19	4.25	4.76
4 $\frac{3}{4}$	9.49	95.20	$8 \frac{3}{4}$ 109.37 $\frac{1}{2}$	1.22 $\frac{1}{2}$	4.37 $\frac{1}{2}$	4.90
4 $\frac{5}{8}$	9.76	97.92	9 112.50	1.26	4.50	5.04
4 $\frac{7}{8}$	10.03	100.64	$9 \frac{1}{4}$ 115.62 $\frac{1}{2}$	1.29 $\frac{1}{2}$	4.62 $\frac{1}{2}$	5.18
4 $\frac{1}{2}$	10.30	103.36	$9 \frac{1}{2}$ 118.75	1.33	4.75	5.32
4 $\frac{3}{4}$	10.57	106.08	$9 \frac{3}{4}$ 121.87 $\frac{1}{2}$	1.36 $\frac{1}{2}$	4.87 $\frac{1}{2}$	5.46
5	10.85	108.80	10 125.00	1.40	5.00	5.60
5 $\frac{1}{4}$	11.12	111.52	$10 \frac{1}{4}$ 128.12 $\frac{1}{2}$	1.43 $\frac{1}{2}$	5.12 $\frac{1}{2}$	5.74
5 $\frac{1}{2}$	11.39	114.24	$10 \frac{1}{2}$ 131.25	1.47	5.25	5.88
5 $\frac{3}{4}$	11.66	116.96	$10 \frac{3}{4}$ 134.37 $\frac{1}{2}$	1.50 $\frac{1}{2}$	5.37 $\frac{1}{2}$	6.02
5 $\frac{5}{8}$	11.93	119.68	11 137.50	1.54	5.50	6.16
5 $\frac{7}{8}$	12.20	122.40	$11 \frac{1}{4}$ 140.62 $\frac{1}{2}$	1.57 $\frac{1}{2}$	5.62 $\frac{1}{2}$	6.30
5 $\frac{1}{2}$	12.47	125.12	$11 \frac{1}{2}$ 143.75	1.61	5.75	6.44
5 $\frac{3}{4}$	12.74	127.84	$11 \frac{3}{4}$ 146.87 $\frac{1}{2}$	1.64 $\frac{1}{2}$	5.87 $\frac{1}{2}$	6.58
6	13.02	130.56	12 150.00	1.68	6.00	6.72

* It should be understood that an English cwt. = 112lbs. is only 110 $\frac{1}{2}$ Spanish lbs., and that said 1 $\frac{1}{2}$ lbs. difference has not been taken into consideration in figuring the above statement.

CORRESPONDING SPANISH, ENGLISH, AND FRENCH GIVEN WEIGHTS.

100 kilog. = 217lbs.	Sack, Bag, or or Bbl. = 300lbs.	Box. 400lbs. net.	Hhd. = 1,500lbs. net.	Ton = 2099 2,000lbs. net.	Ton = 20 cwt. 2,240lbs. net.	Ton = 1,000 kilog. 2,176lbs. net.
13 $\frac{1}{16}$	18 $\frac{3}{4}$	25	93 $\frac{3}{4}$	1.25	1.40	1.36
27 $\frac{1}{2}$	37 $\frac{1}{2}$	50	1.87 $\frac{1}{2}$	2.50	2.80	2.72
54 $\frac{1}{4}$	75	1.00	3.75	5.00	5.60	5.44
81	1.12 $\frac{1}{2}$	1.50	5.62 $\frac{1}{2}$	7.50	8.40	8.16
1.08 $\frac{1}{4}$	1.50	2.00	7.50	10.00	11.20	10.88
1.35	1.87 $\frac{1}{2}$	2.50	9.37 $\frac{1}{2}$	12.50	14.00	13.60
1.62	2.25	3.00	11.25	15.00	16.80	16.32
1.89	2.62 $\frac{1}{2}$	3.50	13.12 $\frac{1}{2}$	17.50	19.60	19.04
2.17	3.00	4.00	15.00	20.00	22.40	21.76
2.34 $\frac{1}{2}$	3.37 $\frac{1}{2}$	4.50	16.87 $\frac{1}{2}$	22.50	25.20	24.48
2.71 $\frac{1}{2}$	3.75	5.00	18.75	25.00	28.00	27.20
2.98	4.12 $\frac{1}{2}$	5.50	20.62 $\frac{1}{2}$	27.50	30.80	29.92
3.25	4.50	6.00	22.50	30.00	33.60	32.64
3.52	4.87 $\frac{1}{2}$	6.50	24.37 $\frac{1}{2}$	32.50	36.40	35.36
3.79	5.25	7.00	26.25	35.00	39.20	38.08
4.06	5.62 $\frac{1}{2}$	7.50	28.12 $\frac{1}{2}$	37.50	42.00	40.80
4.34	6.00	8.00	30.00	40.00	44.80	43.52
4.61 $\frac{1}{2}$	6.37 $\frac{1}{2}$	8.50	31.87 $\frac{1}{2}$	42.50	47.60	46.24
4.88	6.75	9.00	33.75	45.00	50.40	48.96
5.15	7.12 $\frac{1}{2}$	9.50	35.62 $\frac{1}{2}$	47.50	53.20	51.68
5.42 $\frac{1}{2}$	7.50	10.00	37.50	50.00	56.00	54.40
5.69	7.87 $\frac{1}{2}$	10.50	39.37 $\frac{1}{2}$	52.50	58.80	57.12
5.96	8.25	11.00	41.25	55.00	61.60	59.84
6.23	8.62 $\frac{1}{2}$	11.50	43.12 $\frac{1}{2}$	57.50	64.40	62.56
6.51	9.00	12.00	45.00	60.00	67.20	65.28
6.78 $\frac{1}{2}$	9.37 $\frac{1}{2}$	12.50	46.87 $\frac{1}{2}$	62.50	70.00	68.00
7.05 $\frac{1}{2}$	9.75	13.00	48.75	65.00	72.80	70.72
7.32	10.12 $\frac{1}{2}$	13.50	50.62 $\frac{1}{2}$	67.50	75.60	73.44
7.59	10.50	14.00	52.50	70.00	78.40	76.16
7.86	10.87 $\frac{1}{2}$	14.50	54.37 $\frac{1}{2}$	72.50	81.20	78.88
8.13	11.25	15.00	56.25	75.00	84.00	81.60
8.40	11.62 $\frac{1}{2}$	15.50	58.12 $\frac{1}{2}$	77.50	86.80	84.32
8.68	12.00	16.00	60.00	80.00	89.60	87.04
8.95 $\frac{1}{2}$	12.37 $\frac{1}{2}$	16.50	61.87 $\frac{1}{2}$	82.50	92.40	89.76
9.22	12.75	17.00	63.75	85.00	95.20	92.48
9.49	13.12 $\frac{1}{2}$	17.50	65.62 $\frac{1}{2}$	87.50	98.00	95.20
9.76 $\frac{1}{2}$	13.50	18.00	67.50	90.00	100.80	97.92
10.03	13.87 $\frac{1}{2}$	18.50	69.37 $\frac{1}{2}$	92.50	103.60	100.64
10.30	14.25	19.00	71.25	95.00	106.40	103.36
10.57	14.62 $\frac{1}{2}$	19.50	73.12 $\frac{1}{2}$	97.50	109.20	106.08
10.85	15.00	20.00	75.00	100.00	112.00	108.80
11.12 $\frac{1}{2}$	15.37 $\frac{1}{2}$	20.50	76.87 $\frac{1}{2}$	102.50	114.80	111.52
11.39 $\frac{1}{2}$	15.75	21.00	78.75	105.00	117.60	114.24
11.66	16.12 $\frac{1}{2}$	21.50	80.62 $\frac{1}{2}$	107.50	120.40	116.96
11.93	16.50	22.00	82.50	110.00	123.20	119.68
12.20	16.87 $\frac{1}{2}$	22.50	84.37 $\frac{1}{2}$	112.50	126.00	122.40
12.47	17.25	23.00	86.25	115.00	128.80	125.12
12.74	17.62 $\frac{1}{2}$	23.50	88.12 $\frac{1}{2}$	117.50	131.60	127.84
13.02	18.00	24.00	90.00	120.00	134.40	130.56

* In the same way it should be mentioned that the actual difference of weights, Spanish, English, and French, has not been here accounted for. The difference is so small that the Spanish lb. is taken at par in making out the English and French equivalents.

AT A GIVEN HAVANA MARKET SUGAR PRICE, THE CORRESPONDING
VALUE OF CUBAN CANE, UNLOADED AND DELIVERED AT
THE GRINDING MILL CONDUCTOR OR RECEIVER.

HAVANA MARKET SUGAR PRICES.			CUBAN CANE—CARTLOAD AT THE MILL.		
Cts. Ψ lb.	Rs. Ψ @	Dols. Ψ cwt.	2,000 lbs. 1 Sp. Ton.	2,240 lbs. 1 Eng. Ton.	2,500 lbs. 100 arrobes.
10	1	14	10	11.20	12 $\frac{1}{2}$
10	1	28	20	22.40	25
10	1	42	30	33.60	37 $\frac{1}{2}$
10	1	56	40	44.80	50
10	1	70	50	56.00	62 $\frac{1}{2}$
10	1	84	60	67.20	75
10	1	98	70	78.40	87 $\frac{1}{2}$
10	2	1.12	80	89.60	1.00
10	2	1.26	90	100.80	1.12 $\frac{1}{2}$
10	2	1.40	1.00	112.00	1.25
10	2	1.54	1.10	123.20	1.37 $\frac{1}{2}$
10	3	1.68	1.20	134.40	1.50
10	3	1.82	1.30	145.60	1.62 $\frac{1}{2}$
10	3	1.96	1.40	156.80	1.75
10	3	2.10	1.50	168.00	1.87 $\frac{1}{2}$
10	4	2.24	1.60	179.20	2.00
10	4	2.38	1.70	190.40	2.12 $\frac{1}{2}$
10	4	2.52	1.80	201.60	2.25
10	4	2.66	1.90	212.80	2.37 $\frac{1}{2}$
10	5	2.80	2.00	224.00	2.50
10	5	2.94	2.10	235.20	2.62 $\frac{1}{2}$
10	5	3.08	2.20	246.40	2.75
10	5	3.22	2.30	257.60	2.87 $\frac{1}{2}$
10	6	3.36	2.40	268.80	3.00
10	6	3.50	2.50	280.00	3.12 $\frac{1}{2}$
10	6	3.64	2.60	291.20	3.25
10	6	3.78	2.70	302.40	3.37 $\frac{1}{2}$
10	7	3.92	2.80	313.60	3.50
10	7	4.06	2.90	324.80	3.62 $\frac{1}{2}$
10	7	4.20	3.00	336.00	3.75
10	7	4.34	3.10	347.20	3.87 $\frac{1}{2}$
10	8	4.48	3.20	358.40	4.00
10	8	4.62	3.30	369.60	4.12 $\frac{1}{2}$
10	8	4.76	3.40	380.80	4.25
10	8	4.90	3.50	392.00	4.37 $\frac{1}{2}$
10	9	5.04	3.60	403.20	4.40
10	9	5.18	3.70	414.40	4.62 $\frac{1}{2}$
10	9	5.32	3.80	425.60	4.75
10	9	5.46	3.90	436.80	4.87 $\frac{1}{2}$
10	10	5.60	4.00	448.00	5.00

The writer by no means pretends the above to be the exact equivalents of sugar and cane prices. It is only a system much used now in Cuba and other West India Islands. Basis: 1 ton cane = 1 cwt. sugar, or in other words: 100 arrobes cane = 5 arrobes sugar

THE SUGAR MANUFACTURE IN AUSTRIA.

During the past two years, M. Georges Dureau, the able correspondent of the *Journal des Fabricants de Sucre*, has occasionally occupied himself in travelling through the various sugar-producing countries of the Continent, in order to become personally acquainted with the mode of working, and the fiscal and economical details of the sugar manufacture as carried on there; and during the past month has given, in the journal in question, a résumé of the results of his visits to Austria-Hungary. The history of the development and progress of the sugar trade and the mode of regulating the taxation and bounties which, in conjunction with similar fiscal policy in Germany and France, has mainly brought about the present anomalous state of things in the English market, cannot fail to be of interest to our readers, as affording some means of estimating the probable course of events both in Austria and other countries, such as France, Holland, and Belgium, possibly also Germany, where changes in the mode of taxation are either imminent or actually in progress. We have, therefore, prepared an abstract of the three articles entitled “Une Excursion en Autriche,” which appeared on the 8th, 15th, and 22nd of the past month. In view of the fact, that in none of the beet-sugar producing countries can the fallacious policy of State aid by means of bounties on export be considered as a real and permanent success, and that some of the most intelligent men in Germany have already denounced the bounty system as illusory and disastrous in its effects, we may not improbably look for important changes in this direction, and it thus becomes a part of our duty to afford our subscribers every means of forming an accurate judgment in these matters.

M. Georges Dureau, having then just returned from Bohemia, the sugar-producing country *par excellence* of the Austrian Empire, proceeds to review the legislative, commercial, agricultural, and technical conditions of the industry in those countries. Premising that at the present moment the fiscal policy of the Austro-Hungarian Government with regard to sugar presents points of considerable interest, inasmuch as the question is being considered of changing the mode of levying the duties and of applying the system known as the tax on consumption, M. Georges Dureau divides the history of sugar taxation in Austria into five periods, of which the first, commencing in 1840, and lasting nine years, was characterised by the impost on the sugar actually consumed; the second, of only one year's duration, by

the levying of the tax on the roots, either on an agreed-on scale, or on the weight actually put into work; the third, of fifteen years, witnessed a change, the quantity of the raw material being determined, at option, either by actual weighing, or by a calculation based on the capacity of the plant employed; finally, during the fourth and fifth periods, viz., 1865-78, and 1878-88, the weighing system was suppressed, and the tax regulated exclusively on a calculation of the working capacity of the apparatus used for extracting the juice, whether presses, diffusion batteries, or other plant. These two latter periods, during which the diffusion process was brought to perfection in Austria, being the most interesting, M. Dureau considers them in detail. The principle of legislation established by the law of 1865 and its subsequent modifications, was the calculation of the weight of beets worked up on the basis of the capacity of the apparatus employed. Of course it became the interest of the manufacturers to surpass the calculations of the excise, and so minimise the weight of the taxation. They naturally set to work to perfect their machinery and obtain the maximum of results, with what success may be judged from the fact, that the co-efficient originally adopted by the Government had to be raised as follows:—

In 1875 to 222 kilos. of beets per hectolitre, for 24 hours.

„ 1876 „	370	„	„	„
„ 1877 „	650	„	„	„
„ 1878 „	1100	„	„	„
„ 1879 „	1800	„	„	„

and in spite of these rapid successive increases the calculation still always remained below the real quantity. M. Dureau declares, that such was the progress attained by the diffusion apparatus, that the real out-turn of the 24 hours in 1879 reached 5,000 kilos.

Naturally, as soon as Austria began to produce more than required for home consumption, the difficulties of the Treasury commenced, the amount of drawback paid on export continually augmenting until they actually paid out more than they received. The Government tried new and more exact methods of estimating the capacity of the apparatus, but the engineers and manufacturers were still too clever for them, and in 1879 the net product of the sugar tax was only fl. 1,350,841, or say £112,500. The system now in force was then adopted. A fixed sum was settled on as the net product to the Treasury of the sugar duty for a period of ten years, rising from fl. 6,000,000 to fl. 10,500,000. The old basis of calculation was adhered

to, but the eventual deficit, if any, was to be made up at the close of the campaign by proportionate payments on the part of the sugar manufacturers. The result of this arrangement, satisfactory so far as regarded the Treasury, was however seriously to the disadvantage of the smaller sugar-producing establishments, and a law, passed in 1880, was intended to equalise the position of the different classes of manufacturers, while at the same time it increased the net sum receivable by the Treasury.

But again the elaborate arrangements proved insufficient to meet the case. A serious complication arose from the enormous increase of production and export, and consequently of drawback payable by the Treasury, increasing the amount to be made up by the manufacturers to such an extent that in 1884-85 the complementary payments due from these unfortunate individuals amounted to fl. 12,000,000, or on the average, fl. 100,000 (£8,500), for each establishment, while in 1885-86 it was not less than nearly fl. 11,000,000, and this in face of the unremunerative prices then ruling. The manufacturers begged for a delay of three years to pay this heavy sum, but unsuccessfully. The following table shows the results of eight years' application of the so-called contingent system:—

	Guaranteed Net Revenue. Florins.		Complementary Payments. Florins.		Excess. Florins.
1878-79.....	6,000,000	..	4,303,869	..	—
1879-80.....	6,500,000	..	8,167,326	..	—
1880-81.....	10,000,000	..	4,708,002	..	—
1881-82.....	10,400,000	..	—	..	2,381,554
1882-83.....	10,800,000	..	—	..	737,342
1883-84.....	11,200,000	..	1,809,998	..	—
1884-85.....	11,600,000	..	12,045,041	..	—
1885-86.....	12,000,000	..	10,937,188	..	—

In only two years was there a surplus over the guaranteed sum. The amount payable during the last two campaigns was equivalent to nearly 4s. 6d. per ton of beets in 1884-85, and in 1885-86 to about 6s. 5d. per ton, and it must be remembered that the expenses of control, heavy salaries of inspectors, &c., are paid by the manufacturers.

Evidently such a state of things could not continue, and, as is well known, the Austro-Hungarian Government has now proposed a law levying the tax on the consumption of sugar. M. Georges Dureau has endeavoured to collect the opinions of the manufacturers on the probable results of the proposed legislation, and deduces from these

that if it is adopted, there will be a diminution in the quality of the beets, and the proportionate yield of sugar, and consequently an increase in the cost price, a diminution in export and production, leading to an industrial, agricultural, and commercial crisis. He supports these views by elaborate and rather lengthy arguments, some of them bearing rather on the present position of taxation &c., in France, than on matters of interest to our readers. That portion relating to the artificial aid afforded to manufacturers by bounties is, however, of considerable value for the English and Colonial public connected with the sugar-trade, and we shall give this nearly in extenso. The representatives of the sugar industry in Austria appear especially to object to the legislative proposals of the Government for not taking sufficiently into account the artificial advantages enjoyed by foreign manufacturers, fixing the premium on export at much too low a figure and limiting the total amount,—for containing provisions the application of which would tend to restrict the freedom of operation,—finally for enacting temporary arrangements, the consequences of which would be fatal both to the manufacturing and agricultural interests. “With regard to the artificial advantages which the Government proposes to grant to the Austro-Hungarian manufacturers, they observe that the premium on export indicated in the legislative scheme is 1 fl. 16 (1s. 10d.) per 100 kilos. (220lb.) for sugars of 88 $\frac{1}{2}$ % to 93% polarisation,—1 fl. 26 (2s. 1d.) for 93% to 99 $\frac{1}{2}$ %,—and 1 fl. 55 (2s. 7d.) for refined sugars. The manufacturers consider these premiums as insufficient to meet foreign competition, and they assert that under these regulations Austria would at once lose the markets which she has with such labour and cost created for herself in the East. They declare that under the present régime, the *pilé* crushed sugars, which constitute nine tenths of the exports, enjoy a premium of 79 kr. (1s. 4d.) per 100 kilos. (220lb.) Under the proposed new fiscal régime this advantage would be reduced to 11 kr. (2 $\frac{3}{4}$ d.) and the premium on Austrian sugar would only be 1 fl. 55 (2s. 7d.) whilst German refined enjoys a bounty (*bouté*) of 3 fl. 12 (5s. 2 $\frac{3}{4}$ d.), and that of France 6 fl. 30 (10s. 6d.)” For these figures an official document issued by the representatives of the Austro-Hungarian manufacturers is answerable. The same document contains the following statement:—“Export trade with England has become exceedingly difficult, because of the competition of Germany, favoured by geographical position and high bounties; Italy has completely slipped out of our hands, owing to the duty on imported

white sugars, and our consignments of raw sugar to that country have almost ceased. The competition of France and Germany makes it almost impossible to export sugar to Switzerland. Roumania, where our export trade has lately exceeded 100,000 metric quintals, whilst imports from other countries were exceedingly small,—is now a lost market to us, the treaty of commerce which secured us special advantages having lapsed. Our shipments to the East have been very much hindered during the last few months by the large quantity of German and French sugar which is offering; in 1885 the export from Trieste diminished by 12,000 quintals, &c., &c.”

The Austrian manufacturers consider that the premium on export should not be less than 1 fl. 70 (2s. 10d.) and 1 fl. 80 (3s.) for the two lower grades of raw sugar, and 2 fl. 50 (4s. 2d.) for the category of sugars ready for consumption, but they would agree to an eventual progressive reduction in these premiums.

The amount of sugar exported during the twenty-five years from 1860 to 1885, was 10,704,682 metric quintals of refined and 16,020,515 quintals of raw sugar, representing a value of fl. 693,000,000 (£57,750,000), and forming no inconsiderable portion of the export trade of the empire. It has been calculated that the production of this quantity required the cultivation of 1,885,000 hectares of land, the payment of fl. 470,000,000 (£39,000,000) to the cultivators, the expenditure of fl. 15,000,000 (£1,250,000) for seed, of fl. 90,000,000 (£7,500,000) for coal, of fl. 39,000,000 (£3,250,000) for bone-black, fl. 73,000,000 (£6,000,000) for machines, and payment of fl. 50,000,000 (£4,100,000) in direct taxes, without counting the wages of the 64,000 workmen and workwomen employed in the manufacture.

The exports of sugar from the Austrian empire during the last ten years are given by M. Dureau as follows (the quantities are reduced to English tons):—

	Refined.		Raw.		Total reduced to Raw.
1875.....	34,800	....	44,040	....	85,805
1876.....	43,910	....	76,745	....	129,440
1877.....	42,135	....	89,855	....	140,430
1878.....	63,880	....	81,285	....	158,040
1879.....	73,940	....	127,150	....	215,895
1880.....	66,510	....	159,970	....	239,780
1881.....	88,820	....	179,945	....	286,530
1882.....	98,965	....	121,820	....	240,595
1883.....	122,805	....	129,000	....	276,500
1884.....	135,825	....	177,380	....	340,380
1885.....	109,345	....	124,070	....	255,290

The development of beetroot sugar production in Austria during the past fifteen years has been remarkable. The number of factories is given as 24 in 1836, 53 in 1846, 130 in 1856, 139 in 1866, and at the present moment 223. Though this latter number is only half that of the French factories, yet, owing to the greater concentration of labour and the effectiveness of the apparatus, the production in Austria has lately much exceeded that of France.

The superficial area under beetroot cultivation, in 1884, was in—

Bohemia....	151,800	hectares.*
Moravia	55,000	„
Silesia	10,800	„
Lower Austria..	1,700	„
Galicia	700	„
Total..	220,000	„

Or 85,000 acres.

The average for the first three of these countries is 4·8% of the whole surface under cultivation.

It will have been noted that there are no exact data available with regard to the real turn-out of the factories, hence the quantity of sugar actually produced in Austria is exceedingly difficult to determine even approximately. M. Dureau attempts a calculation, which after all is of little value, as he declares that the amount at which he arrives is far below the real quantity. The maximum was attained in 1884-85, the quantities being, according to the estimate of Mr. Herbertz, of the *Deutsche Zuckerindustrie*, 676,940 tons, and according to Mr. Licht, of Magdeburg, 557,766 tons of raw sugar, which, according to the former authority, underwent in 1885-86 the very considerable diminution of 40%. M. Dureau considers that the production for the current campaign may reach 500,000 tons. There are now in operation 223 manufactories and 11 refineries, distributed as follows:—

	Factories.	Refineries.
Bohemia	145	7
Moravia	51	3
Silesia	9	1
Lower Austria	3	..
Galicia	1	..
Hungary	14	..
	<hr/> 223	<hr/> 11

* Hectare = nearly 2½ English acres.

Of these 234, there are 152 raw sugar factories; 34 producing raw and white sugars; 42 producing exclusively white sugar; and 6 making only pilés (crushed). Of the 223 sugar factories, nearly all use the diffusion process, only three using presses.

CUBAN SUGAR CROP OF 1886-87.

The following information, respecting the prospective sugar crop in Cuba, is extracted from a report by Mr. A. de C. Crowe, Her Majesty's Consul-General at Havana, dated the 30th October last:—

“Accounts received from the sugar-producing districts in all parts of the island tend to the conclusion that the sugar crop of 1886-1887 will be one of the largest hitherto gathered, and the probable result of the grinding is confidently expected to produce at least 800,000 tons, a figure not hitherto reached in the sugar annals of Cuba.

“This calculation is necessarily subject to climatic disturbances, and should prices at new year not rise somewhat, or even maintain themselves at their present level, this abundance will hardly enable planters to recover from the effects of previous bad years.

“Much of the last crop remained in the fields, owing to the inability of planters to defray labour charges for cleaning and general purposes.

“This excess of last year's material, representing a considerable number of hogsheads, will now presumably be worked up and increase the expected coming large returns.

“Planters have been in the habit of complaining of the insufficiency of the labour force in the island since slave emancipation deprived them of forced labour, but in view of the fact that the last crop of some 700,000 tons was gathered and ground without trouble, this can hardly be the case; moreover, this year, as many as 45 per cent. of whites were successfully employed in the fields and factories, showing that black labour is not indispensable on the plantations. This successful employment of free white labour has decided some planters to adopt for the coming crop a system somewhat similar to that followed by European beet-growers, of dividing their field for labour into colonies, which, in conjunction with other economical and mechanical reforms and improvements will, it is expected, enable them to produce cheaper sugar.’

DISCUSSION IN BOSTON ON THE UNITED STATES SUGAR TRADE.

This was the subject discussed at the Merchants' Club, in Boston, on December 9th, 1886. The opening address, as reported by the *Boston Herald*, was by Mr. Charles O. Foster, of the Boston Sugar Refinery Co., who said:

The term sugar was originally used to classify all substances having a sweet flavour. Now it is reserved in a commercial sense to denote true crystallizable sucrose, or the product of canes and beets. The production of cane sugars is almost a tropical industry, the cane being sensitive to climatic influences and ruined by frosts. Thus far the greatest success has been upon the tropical islands, where heat and moisture are more equally distributed, such as Cuba, Porto Rico, and various similar places in the West Indies, and Mauritius, Java, Luzon and Panay in the East. The cane is propagated, not by seeds, but by cuttings, having to be renewed in some places every year or two years, while in more congenial soils or climates it is reproduced upon its own stump every year up to even ten years. The extraction of sugar from beets is a very recent industry, as far as commerce is concerned. Cane and beets are called chemically identical, but the impurities, or non-sugar, in beets are much more detrimental in actual working, and are thus less valuable than cane for equal polariscopic tests. While sugars refined from cane and beet cannot be distinguished scientifically, it is an accepted fact that beet sugars do not have sweetening power equal to cane product. The difference is estimated as high, and even higher than 10 per cent.

After presenting facts regarding consumption in the United States, the decline in prices, which he attributes to overproduction, caused by bounty-fed beet sugars, he touched the tariff question as follows:

I would reduce our present enormous duty to one-half cent. per pound specific upon all sugars not above No. 14 D.S. I need not argue this at length, but will merely say the people seem to be ready for it, and will demand a large reduction soon. This would reduce our sweets revenue from about \$52,000,000 to perhaps \$15,000,000, which very soon would increase from greater consumption.

The speaker entered into an argument of considerable length relative to reciprocity treaties, concluding his remarks in these words:

In closing I wish to say that the question of high or low tariff is of little importance to a refiner. He looks for his advantage merely at

the existing difference between value of raw and refined sugars. If low tariff gives larger consumption, it will be found that new refineries will appear to amply fill all the requirements. But it is of the first importance that, whatever duty may be assessed, all ports shall pay equally 100 per cent. of the law.

The sugar industry of Cuba was the theme of Mr. Edwin F. Atkins' speech, made from the standpoint of a refiner. As it deals with the question of protecting our home industry, we give a full synopsis as it bears upon the pending question of free sugar. Mr. Atkins said:

The changes in modes of doing business during the past dozen years have brought the consumer much nearer to the producer, and the American refiner now buys the bulk of his sugars directly from the producer, or his agent abroad. It is the refiner who furnishes money for duties to the extent of over \$50,000,000 yearly, adding it to the price which the consumer pays, and taking his risk of collecting it again on thirty days time. There is little reason to fear that the law of supply and demand will cease to regulate the price of sugar, and it is highly improbable that any increase or decrease of duties here will affect the foreign producers, except as higher or lower prices for the consumer may increase or decrease his market by affecting consumption. Cuba, to-day, ranks second only to Germany in its sugar crop, and supplies nearly one-half of the total consumption of the United States. Yet Cuba has lost her supremacy where she formerly dictated her own terms to the markets of the world. She has now but one customer left, and that customer is allowed to make his own price.

Canes contain some 10 to 11 per cent. of sugar in Louisiana and 15 to 16 per cent. in Cuba; by the old open kettle or muscovado process, the average yield in Louisiana is about $3\frac{1}{4}$ to 4 per cent., while in Cuba it is 6 per cent. By fairly well conducted estates using vacuum pans and centrifugals, the average result in Louisiana is some 6 per cent., while the same in Cuba gives 8 per cent. The maximum yield to the present time in Louisiana—that of the estate of ex-Governor Warmoth, who is working with all the latest improved machinery, and who has a station of the United States Agricultural Department upon his estate—was 8.18 per cent., while figures I have before me from Cuba show 10.40 per cent. obtained the past season upon one of the well-equipped estates there. It is still, as you see, far short of the sugar contained in the cane. Improved machinery can and will obtain better results, both here and abroad, but the limit of yield is the sugar in the plant, and cane raised in this country does not and

cannot contain sugar in sufficiently large quantities to make its manufacture cheap.

Gentlemen, even the present duty of 80 per cent. on the value of the imported article will not make the home production remunerative. At the best, it cannot do more than exist at current prices in spite of the tax upon consumers of \$52,000,000, which tax is now being increased over \$3,000,000 per year. We find a crop of 126,000 tons in 1850, with the duty 30 per cent. *ad valorem*, and the proportion of domestic production 47 per cent. of the consumption. We find the present crop estimated at under 100,000 tons, with a protection equal to 80 per cent. *ad valorem*, and the proportion of production as compared with the consumption, but $7\frac{1}{2}$ per cent.; a loss of 26,000 tons in 35 years, 42,000 during the past three years, and 20,000 from the last campaign; yet still we are told that, with a little more protection, the country will produce its raw sugars from cane or sorghum or beets. It is claimed that an acre will produce 15 tons of sorghum cane, and that the cane contains 90 pounds of sugar per ton, if it could all be recovered—say, 1,250 pounds of sugar per acre. Louisiana lands produce about 20 tons average of cane to the acre, containing 10 per cent. of sugar, or about 4,000 pounds per acre. Good sugar land in the Spanish, English, or French West Indies will produce 30 tons of sugar cane to the acre, containing 300 pounds of sugar to the ton, which, if it could be all recovered, would give 9,000 pounds of sugar per acre. By imperfect work nearly one-half of the sugar in the cane has been lost, but any improvement which is adopted in this country will be followed by other cane-producing countries, where the improved results will be more marked than here. Such being the conditions, does it not seem folly to try and protect a failing industry at so heavy a cost to the people—an industry that with time is doomed to destruction through natural causes? After the experience of the past twenty years in trying to foster domestic production is it not time that the refining interests and the consumers should receive some consideration in the shape of the abolition or reduction in the duties on foreign raw sugars?

Ex-Commissioner of Agriculture, George B. Loring, spoke at length, reviewing the difficulties connected with the production and sale of sugar in this country, and said: "I think you will be inclined to agree with the opinion expressed by Professor Wiley, who has carefully investigated the matter, that 'the production of sugar and

molasses in Louisiana has almost ceased to be profitable. Damage from overflow, unfavourable seasons and depression of prices have been the causes which have rendered the cultivation of the sugar cane a precarious undertaking.'” He reviewed the work done at Fort Scott by Professor Wiley with the diffusion battery, which gave 144 pounds of fine sugar per ton from Louisiana cane, fully 30 per cent. more than has ever been obtained by the best milling on similar cane in Louisiana. The result shows that by diffusion and carbonization the maximum yield of sugar can be obtained. The sorghum industry was reviewed and the statement made on the authority of Professor Wiley, that “any attempt to make sugar out of such juice has not proved financially a success. The sorghum problem, he says, is now one of the agronomist and mechanic, and not for the chemist. If a good and steady percentage of sucrose can be obtained in sorghum, and it can be worked promptly and quickly from the field, the business can be made a commercial success.”

At length Mr. Loring considered the tariff question, concluding as follows:—

The success of the American policy, as it was called by Mr. Clay, its early advocate, its effect upon our national prosperity, the recognition of its value by so many nationalities which have suffered from a temporary trial of opposing systems, naturally induce all our struggling industries to turn to it for support. The fostering care of the Government in matters material and intellectual is now recognized as a part of its duty wherever publicly endowed colleges, economic experiments, national improvements, and protection of our industries are established. The great enterprises of our land expect and receive Governmental encouragement; and it can hardly be expected that the sugar industry, whose difficulties and discouragements I have laid before you, should of all other industries be indifferent to Government aid, either by customs tariff or by bounty. The universal consumption of sugar as a necessary of life cannot be overlooked; moreover, in every consideration of the policy to be pursued with regard to the admission of foreign sugars into our market. That free sugar has become a necessity to a large class of consumers, and the refiners, there seems to be but little doubt; nor can there be a doubt that the industry engaged in its production is entitled to a bounty. Let me suggest, then, free sugars from all countries where there is no export duty, and a bounty on sugars produced on our own soil.

HOW SUPERB SUGARS PAY A REDUCED IMPORT DUTY ON ARRIVAL AT UNITED STATES PORTS.

Probably before the writer or the reader was born, sugar was always bought and sold, upon the Dutch standard of colour. An expert can easily detect that this standard has come to be a poor and inadequate medium for testing sugars, specially those kinds known as clarified or centrifugals. The crystallization and consequent colour and quality of these sugars, does not assimilate with the old styles and colours of the Dutch standard times.

If we make a quantity of clarified or centrifugal sugar, and let the revolving machine work until all the molasses is separated from the bright little block lumps, we will vainly try to find from the Dutch standard a colour or quality to assimilate with the beautiful little diamonds. Consequently, the old Dutch standard is now an exceedingly imperfect medium, for the classification of sugars. The only scientific instrument known, to answer all requirements, is the polariscope, and it has promptly been adopted by every country and every person in the sugar business.

Now, without the slightest pretention of criticising the doings of a Government, or of a set of honourable gentlemen, it must be mentioned here that the men selected by the United States Government for fixing the duties on sugars, were not the proper persons for the occasion. They did their best, but any practical sugar maker, or an expert in the business, taking a glance at the work they accomplished, quickly detects that they knew little or nothing about sugars. One set strongly supported the old Dutch standard system, and another set selected for adoption the polariscope. The Government, to satisfy both parties, or at least to keep them quiet, confirmed the use of the Dutch standard, in combination with the testing by the polariscope. This happened in 1883.

Let us now go into a few practical particulars. A lot of Derosne or Rellieux triple-effet sugar No. 20—highest Dutch standard—should be scientifically of the same quality as clarified or centrifugal sugar polarizing 100° —highest polariscope graduation. Yet the colour and quality of a crockery or porcelain white-washed food plate at a table, is of an entirely different colour and quality of the flint or cut-glass for the drinking water. Both are colourless and clean, pure white, siliceous manufactured goods, which have gone through two different processes. So does Derosne and Rellieux sugars and the

clarified or centrifugals go through different processes, though both sugars originated from the juice from the cane.

Now, common sense shows that Muscovado, or open kettle brown sugar, "fair to good refining," No. 11 Dutch standard, is by no means the same class or quality as clarified or centrifugal sugar also No. 11 Dutch standard. The former will, probably, polarize 90° , while the latter may polarize 97° .

The United States refiners—and everybody else—know the above to be the fact, but it does not pay them to meddle in the matter. The import duties on refined or high graded and qualities of sugars, are exceedingly extravagant in the United States, or it may better be said: its importations are forbidden. The duties on medium and lower classes are also extravagant, but are fixed in a way that suits the United States refiners—protecting the home industry.

Again, if we take a lot of Muscovado brown sugar, "fair to good refining," No. 11 Dutch standard, no matter what kind of cane it came from, or how smart a sugar-maker may be, it will not polarize more than 90° or 91° , for the simple fact that its quality is not and cannot be made better.

Now let us take on hand a lot of clarified or centrifugal sugar, that has sprung from the same cane and made by the same smart man who manufactured the previous Muscovado lot mentioned, and, by letting the revolving centrifugal run to its full capacity, we find ourselves with a lot of sugar No. 15 Dutch standard—if such could be said—and polarizing 97° . On arriving at such a point, we see that such lot of sugar has no United States market. The import duty on said colour is extravagant. In such a case, what does the West Indian sugar-maker do? The process is an exceedingly plain one. When the sugar runs into the revolving centrifugals, he will not let them run on full speed; consequently, he does not let all the molasses separate from the sugar grains. A quantity of the molasses remaining attached or mixed with the beautiful bright sugar, the general colour is left to be uniformly dark, bringing it to be No. 11 Dutch standard, or any other desirable colour. If the sugar-maker wants to go quicker, and with less trouble and care, through the process or operation, he will pour buckets of burnt molasses into the revolving centrifugals, which will stick to the sugar grains, fulfilling the desired results.

If you want to call this process artificial colouring, you may do so, but it is by no means spurious or harmful, as the whole thing is

done with molasses. The writer remembers, some five years ago, the great fuss raised by the ignorant United States Custom House appraisers, on similar sugars imported from Demerara and other countries.

The reader now finds that we have reached the point where a lot of clarified or centrifugal sugars No. 15 Dutch standard, polarizing 97° , has been brought for Custom House purposes down to No. 11 Dutch standard without losing in quality, and pays the same United States import duty as the Muscovado lot, also No. 11 Dutch standard. The market price gives each its quality by noting that one polarizes 90° , while the other shows 97° .

Of course, said lot of centrifugal sugar polarizing 97° , and, apparently, No. 11 Dutch standard, after going through the United States Custom House, could be washed with pure water, and return to be No. 15 Dutch standard, but as there is no demand from the general public for said sugar, the refiner melts the sugar and mixes it with others.

All the above items brings us to the following conclusions:—

1. That the Dutch standard, with our actual improved sugar making, does not answer the purposes which it did formerly.
2. That the only undisputable process known, to classify and qualify sugars, is the polariscope.
3. That the basis, by which the United States exacts her import duties on sugars, is exceedingly incorrect, and against all modern improvements known, injuring the interests of the American nation and people.

J. D. EKISS.

DIFFUSION APPLIED TO SUGAR CANE IN SOUTH BRAZIL.

Communication by GEORGE STADE, Trinidad.

The following is a translation, in abstract, from a communication of a confrère of mine, Mr. Hans Nitzsch, technical manager of the Central factory, Barcellos, near Campos, province Rio de Janeiro, in Brazil. As the topic of success or failure of the diffusion procédé is, at the present moment, in all cane growing countries over the world, a general one, I fancy, these few lines may not perhaps be found to be without interest, even if they make no claim of completeness.

The arrangements and machinery of the complete plant of diffusion was made by the Sudenburger Maschinenfabrik in Magdeburg,

Germany, one of the few makers who satisfy, by their experience in building new cane sugar usines, all demands.

The machinery is constructed for a work of 100 tons of cane per day, and the proof working of it was found (after overcoming the almost unavoidable preliminary inconveniences) in every regard to be perfectly satisfactory.

They sliced during seven days, where the working went on, about 670 tons of canes. However, the extraction was not quite complete, as naturally could be expected on the starting; there was left nearly up to 1 per cent. of sugar in the slices. But it must here be considered that the labourers were still inexperienced, and not perfectly skilled, and to this is due a great deal. On the other hand this can easily be remedied if it should be found necessary (which is not very likely), by increasing the number of diffusers from 12 to say 16 vessels.

The juice is beautifully pure, bright and clear, and works just as easy as mill liquor. On the whole Mr. Nitzsch can only fully certify what is said already by Mr. Mitscher about the Java experiments.

"The application of the diffusion proceeding to the sugar cane meets neither in technical nor mechanical regard with any difficulties, while on the other side in financial regard, the sugar extraction (Rendement) is far superior to any other proceeding, even taking into consideration the highest norme for the cost of production."

With the mill work previously used at Barcellos the extraction from the cane was about $7\frac{1}{2}$ per cent. syrup and molasses sugar together.

"With diffusion now at work they have got alone in first product over 8 per cent. dry white sugar (granulated for consumption), equal to about 9 per cent. raw sugar for exportation, polarizing 96 %."

The full consumption could not be ascertained with regard to coals, but it seems that it will not likely come to more than 36 tons wood for 100 tons canes (megass left out of consideration in this case.)

Mr. Nitzsch started the big sugar making season in October, and is going on with it up to about the end of the year, when he intends to give full particulars about the results.

NOTE.—Factories supplied, or to be supplied, with diffusion, not in the West Indies :—

1. Aska, Madras, East Indies.
2. Almeria, Spain.

3. Mobul } (Klegasse) Spain.
4. Nerja } (Klegasse) Spain.
5. Tor del Mor.
6. Braculy, Rio de Janeiro, Brazil.
7. Barcellos, Campos, Brazil.
8. Parkinson Sugar Works, Ottawa, Kansas, U.S.
9. Fort Scott, Kansas, U.S. Government Station.
10. Penn. Nonpareil, British Guiana, etc.

THE SAN PAULO SUGAR AND DISTILLERY COMPANY (LIMITED).

Registered by Walter Webb, solicitor, 23, Queen Victoria Street, E.C. The capital of the company is £60,000, divided into 60,000 shares of £1 each. Object, to carry on in the empire of Brazil the business of sugar manufacturers and refiners and rum distillers, and, as incidental thereto, the business of planters, cultivators, and merchants, and any other business which is usually or can conveniently be carried on in connection with such businesses respectively; futher, to enter into and carry into effect an agreement between Robert George Graham, on behalf of himself and other persons, holders of debentures issued by the San Paulo Central Sugar Factory of Brazil (Limited) (now in liquidation) of the one part, and this company of the other part, providing for the sale or transfer of this company from such persons of the shares in the above-named Brazilian company, which they are entitled to in respect of their debentures. The first subscribers are:—J. Kincaid, C.E., 11, Great George Street, S.W., 1 share; T. O'Hagan, 20, Bucklersbury, E.C., 1; H. O'Hagan, 20, Bucklersbury, E.C., 1; A. J. Davis, accountant, 13, Ribblesdale Road, Hornsey, 1; R. G. Graham, stockbroker, 7, Finch Lane, 1; J. Wethered, colliery proprietor, Clifton, Bristol, 1; G. White, stockbroker, Bristol, 1 share. The number of directors shall not be less than three nor more than seven, excluding the managing directors. Qualification, the holding of £200 in shares or stock of the company. The first directors shall be R. G. Graham, J. Kincaid, J. Wethered, and G. White. The remuneration of directors shall be the sum of £400 per annum, and in addition thereto a sum equal to one-tenth of the surplus profits available for distribution as dividend after payment for the year of a dividend of not less than 7 per cent. upon the capital of the company for the time being issued.

CLARIFICATION BY PHOSPHORIC ACID.

Mourilyan Plantation, Northern Queensland,

19th October, 1886.

TO THE EDITOR OF THE "SUGAR CANE."

Sir,—Referring to the practical contribution "On the Clarification of Sugar by Phosphoric Acid," by Mr. Dod, of Roque, Cuba, in your last January number, I thought it might interest you and others in the sugar trade, to send you samples of our daily produce, made entirely by this process. Although this Company have a complete charcoal plant, it is not used, as we are quite satisfied with the purity of the sugar clarified by phosphoric acid.

The sugar marked A is our standard first-class quality, and seldom varies. The sample B is made entirely from the molasses received from the drying of A sugar, without any further treatment than by merely reducing it to 30° B., with pure water.

Of course, every factory has its own method of working. We clarify hot. I do not approve of cold defecation, as suggested by your correspondent. The time required for impurities to precipitate would be too great for a practical work, and nothing to be gained by it, that I can see. The clarification by this process is quick and certain, and only requires a little intelligent attention on the part of the men employed at this stage of the manufacture.

Yours faithfully,

ROBERT R. SMELLIE.*

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and
323, High Holborn, London, W.C.

ENGLISH.

APPLICATIONS.

15115. J. BAKER, J. A. BAKER, W. R. BAKER, and G. S. BAKER, London. *Improvements in machines for the manufacture of sugar wafers and the like.* 20th November, 1886.

*We have received the samples A and B, and shall be glad to forward them to those of our readers who may wish to see them.—ED. S. C.

GERMAN.

ABRIDGMENTS.

30918. F. MAYER PETÖHAZ, Hungary. *Improved apparatus for promoting rapid circulation of the liquid in diffusion apparatus.* 19th August, 1884. In order to be able to thoroughly and uninterruptedly lixiviate very finely chopped roots when the liquid is rapidly circulated, vertical double sieves (slit sieves), in the shape of hollow plates or bars, are fixed upon the bottom sieve of the diffusers. These sieves are made of perforated tin plate or of wire-cloth. The juice is by this means enabled to flow freely through the perforations and hollow space of the sieves sideways amongst the root cuttings.

30925. ALBERT FESCA, of the firm of A. Fesca & Co., Berlin. *Process and apparatus for forming sugar plates and strips in the manufacture of cube sugar.* 17th September, 1884. The raw material, after being freed from syrup by the process called "grünschleudern," is allowed to stand, and receives a first covering by means of sugar solution ("Kasch"), prepared from soft sugar and water or clarifying syrup. This solution imparts covering to the raw material and serves on subsequent covering in the centrifugal, in which it cools to a spongy mass, as a dividing medium for the clarifier. The sugar moulds have, on the side turned towards the centre of the centrifugal, a large receptacle for the sugar solution; they are formed of zig-zag or U shaped plates. These plates are held in place by four studs, which connect them together.

31251. G. FRITSCHÉ, Schönau, near Neutitochein, Moravia. *Improved process for purifying root juices by means of clay, especially Fuller's earth and burnt lime.* 5th November, 1884. In order to make the Fuller's earth produce a better result, it is mixed before use with diluted sulphuric or phosphoric acid, and left under its influence for five or six days. In order to neutralize the acid, a quantity of milk of lime is added to the juice, either at once or afterwards.

30529. J. HALPAUS, Ustie, Podolia, Russia. *Condenser for evaporating apparatus used in the manufacture of sugar.* 17th August, 1884. The steam to be condensed, passing through a pipe from the evaporating apparatus, is first cooled in a jacket arrangement by coming in contact with its cooler exterior surface, and with a cooling jacket supplied with water by a special pipe. The uncondensed steam passes through a pipe in the upper part of the apparatus. This part of the apparatus has an opening, and is provided with alternate plane and annular shallow bowls, over which the cold water flows after leaving the cooling jacket, and down in a zig-zag manner over the inner edges of the rings and the outer edges of the plates. The steam enters the apparatus at this opening, mixes in this way with the cold water, and is completely condensed. The cooling water, together with the condensed

steam, runs off through the main pipe. The air containing the steam is sucked up through a pipe by means of an air pump.

31163. SOCIÉTÉ ANONYME DE RAFFINAGE SPÉCIAL DES MELASSES, Paris. *Process for purifying the saccharine juices of beetroot, sugar cane, &c., whilst still in the cuttings.* 27th May, 1884. The shreds are dipped in a clarifying bath, containing from one to five per cent. lime, drained, and at once heated to from about 85 to 90 degrees, in order to coagulate the proteids contained in the cells, by which means the juice, after undergoing one of the ordinary processes of diffusion, pressing or maceration, is extracted. When the juice is obtained by the pressing process, the shreds which are immersed in the clarifying bath can be heated in the cylinder of the press. Salts, such as chloride or sulphate of zinc, iron, aluminium, magnesium, manganese, sulphite of lime, or diluted acetic, oxalic, or sulphuric acids, can be used instead of lime in the clarifying bath. The proteids remaining in the lixiviated shreds enhance their value as cattle food.

BELGIAN.

30916. G. HAMBRUCH, Berlin. *Apparatus for concentrating liquids.* 24th July, 1884. The heating pipes are wound in flattened spirals in the vacuum apparatus over a number of cups fixed one above the other. The coils are soldered together so as to form ribbed surfaces, down which the finely divided liquids trickles without coming in contact with the cup; for convenience of repair, each cup is separately suspended by rods from the cover.

AMERICAN.

345324. CHARLES H. C. SCHMANDT, Brooklyn, New York. *Bone-black kiln.* July 13th, 1886. The invention consists in substance in placing beneath every discharge pipe an adjustable disk, which is combined with mechanism, for automatically oscillating it. Also in combining such disks with wipers or scrapers and in other "details" of apparatus difficult to describe without drawings.

349027-349028. W. BAUR and Y. V. V. BOORAEM, Brooklyn, New York. *Machine for cutting sugar, also a tray for picking up and handling cut sugar.* The first mentioned invention consists in a machine for cutting large slabs of sugar into pieces like dominoes, by means of reciprocating cutters: the second in a tray for picking up and carrying the dominoes made in the last mentioned machine. September 14th, 1886.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO NOVEMBER 30TH, 1885 AND 1886.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1885.	1886.	1885.	1886.
	Cwts.	Cwts.	£	£
Germany	6,698,675	5,150,382	4,253,026	3,110,875
Holland	261,369	255,039	185,291	161,847
Belgium	429,596	621,778	299,976	381,187
France	26,224	37,405	21,616	23,157
British West Indies & Guiana	2,538,413	1,834,279	2,048,260	1,449,925
British East Indies	804,888	739,676	422,812	375,048
China and Hong Kong	14,679	48,257	5,644	28,005
Mauritius	248,356	278,750	180,854	174,510
Spanish West India Islands	653,659	21,409	499,820	15,459
Brazil	1,201,482	511,454	725,016	331,905
Java	3,338,298	3,803,932	2,530,613	2,782,867
Philippine Islands	432,690	531,022	231,632	265,078
Peru	582,023	422,297	419,438	304,677
Other Countries	548,018	572,957	380,242	397,728
Total of Raw Sugars ..	17,778,370	14,831,637	12,204,240	9,802,268
Molasses	380,826	424,587	134,574	135,016
Total Raw Sugars ....	.....	.....	12,338,814	9,937,284
REFINED SUGARS.				
Germany	766,052	1,595,226	652,952	1,315,714
Holland	1,181,365	1,093,693	1,085,272	938,008
Belgium	64,595	100,812	65,731	92,504
France	465,057	886,693	442,514	727,781
United States	2,153,195	1,418,110	1,951,745	1,225,434
Other Countries	5,839	821,438	5,422	672,411
Total of Refined	4,636,103	5,915,972	4,203,636	4,971,847

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	118,384	135,508	91,444	90,051
Belgium	73,787	47,884	53,689	33,488
France	73,460	40,801	57,039	30,056
Portugal, Azores, & Madeira	77,618	89,812	58,686	63,331
Italy	286,522	129,910	216,170	89,650
British North America	17,667	18,058	11,974	13,360
Other Countries	289,097	336,789	226,316	254,868
Total	936,535	798,762	715,318	574,804

SUGAR STATISTICS—GREAT BRITAIN.

TO DECEMBER 25TH, 1886 AND 1885. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1886.	1885.	1886.	1885.	1886.	1885.
London	75	90	323	324	308	318
Liverpool ..	77	94	251	275	231	258
Bristol	4	9	59	48	55	52
Clyde	34	66	234	243	202	261
Total ..	190	259	867	890	795	889
	Decrease.. 69		Decrease.. 23		Decrease.. 94	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. FOR OCTOBER, 1886 AND 1885.

	STOCKS.		DELIVERIES.		IMPORTS.	
	December 1st.		In November.		In November.	
	1886.	1885.	1886.	1885.	1886.	1885.
New York	96	51	53	50	47	42
Boston	17	14	11	10	12	5
Philadelphia. . . .	2	3	9	7	8	6
Baltimore . . . . .	..	..	..	..	..	..
Total.	115	68	73	67	67	53
	Increase.. 47		Increase.. 6		Increase.. 12	
Total for the year —	—		1033	1034	1091	1013

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, December 16th, 1886.

FAIR REFINING.	960/0 CENTS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
Dec. 16, 1886.—4 11-16c.	5½c.	5 13-16c.	5½c.	Jan. 1, 1886—57,328 tons.
Dec. 17, 1885.—5 9-16c.	6½c.	6¾c.	6¼c.	Jan. 1, 1885—89,186 tons.
Dec. 18, 1884.—4¾c.	5 5-16c.	5¾c.	5½c.	Jan. 1, 1884—60,900 tons.
Dec. 20, 1883.—6 3-16c.	7 1-16c.	7¾c.	7¾c.	Jan. 1, 1883—50,297 tons.
Dec. 21, 1882.—7c.	7 11-16c.	8¾c.	8½c.	Jan. 1, 1882—43,927 tons.
Dec. 22, 1881.—7¾c.	8 1-16c.	9 3-16-½c.	8¾c.	Jan. 1, 1881—66,999 tons.
Dec. 16, 1880.—7¾c.	8 5-16c.	9½c.	9½-¼c.	Jan. 1, 1880—63,558 tons.
Dec. 18, 1879.—7½c.	8¾c.	9½-¾c.	9¼c.	Jan. 1, 1879—50,773 tons.
Dec. 19, 1878.—6¾c.	7 7-16c.	8¾-¾c.	8½-¾c.	Jan. 1, 1878—43,230 tons.
Dec. 20, 1877.—7¼c.	8c.	9¾c.	9½c.	Jan. 1, 1877—25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
30TH NOVEMBER, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1886.	TOTAL 1885.	TOTAL 1884.
195	195	33	312	175	21	931	949	799

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
30TH NOVEMBER, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1886.	TOTAL 1885.	TOTAL 1884.
1180	470	39	383	184	333	2589	2585	2419

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP,
OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1886-87.	1885-86.	1884-85.	1883-84.
	Tons.	Tons.	Tons.	Tons.
France.....	500,000 ..	298,407 ..	308,410 ..	473,676
German Empire	950,000 ..	825,081 ..	1,154,817 ..	986,402
Austro-Hungary....	525,000 ..	377,032 ..	557,766 ..	445,954
Russia and Poland ..	475,000 ..	540,600 ..	386,433 ..	307,696
Belgium	80,000 ..	48,421 ..	88,463 ..	106,586
Holland and other				
Countries.....	50,000 ..	37,500 ..	50,000 ..	40,000
Total.....	2,580,000	2,127,041	2,545,889	2,360,314

Mr. Licht's present estimate of the 1886-87 crop is the same as last month.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The only satisfactory feature which we can report of sugars is the great diminution on the stocks in this country ; they are nearly 70,000 less than on the 1st January last ; prices, as compared with 1st December, are from 3d. to 6d. per cwt. higher, the market closing dull, which may be partly attributed to the holidays.

Beet 88% f.o.b. is now 11/- for prompt delivery, and 11/1½ and 11/3, according to position.

The large supplies of raw and refined beet sugars in prospect scarcely admits of the hope of better prices in the near future.

The imports of American refined for November were 8,323 tons, making a total for the eleven months, 1886, of 70,904 tons, against 107,632 tons for the same period of 1885.

The imports of French refined in November were 14,271 tons, against 1,047 tons in November, 1885 ; and from Germany and Austria 9,278 tons, against 5,349 tons in 1885. The total increase in the imports of refined of all kinds for the eleven months of 1886, as compared with 1885, is 63,993 tons, whilst our exports of refined sugars have fallen off nearly 7,000 tons.

The deliveries of raw sugar into the United Kingdom on December 25th, show a decrease of 23,760 tons upon 1885, and the imports the larger decrease of 93,984 tons.

The stocks in the United Kingdom on December 25th were 190,325 tons, against 258,968 tons in 1885.

Present quotations for the standard qualities, as under, are :—


FLOATING.		Last Month.
Porto Rico, fair to good Refining	11/- to 11/6 against	10/6 to 11/-.
Cuba Centrifugals, 96% polarization	13/- to 13/3	12/9 to 13/-.
Cuba Muscovados, fair to good Refining ..	11/- to 11/6	„ 10/6 to 11/-.
Bahia, middling to good Brown, No. 7 to 8½	10/- to 11/-	„ 9/6 to 10/6.
Pernambuco, good to fine Brown, No. 10..	10/9 to 11/-	„ 10/6 to 10/9.
Java, No. 14 to 15, good to strong	13/6 to 13/9	„ 13/3 to 13/6.
LANDED.		Last Month.
Madras Cane Jaggery	8/3 to 8/9 against	8/- to 8/6.
Manilla Cebu and Ilo Ilo	8/3 to 8/9	„ 8/- to 8/6.
Paris Loaves, f.o. b.	15/- to 15/6	„ 14/9 to 15/3.
Titlers	17/3	„ 17/3
Tate's Cubes	19/6	„ 19/6
Austrian-German Beetroot, 88% f.o.b. ..	11/- to 11/3	„ 10/6 to 10/9.

THE SUGAR CANE.

No. 211.

FEBRUARY 1, 1887.

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 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

The *Havana Weekly Report* announces that negotiations are in progress for establishing at Chorrera (Cuba), another large sugar refinery, by transferring thither the plant of a United States' refinery, which can put into work 150,000 lbs. (67 tons) per day.

The Kreis-Iulich sugar factory shows a loss of M. 59,665 for 1885-86. The loss brought forward from the previous campaign was M. 158,648. The share capital is M. 900,000. The Brunswick factory shows a loss of M. 50,749, against a gain in the preceding year of M. 2,662. The share capital is M. 300,000. Kohlmann & Co.'s glucose factory at Frankfort, a/o, has made a profit of M. 248,521, with a capital of M. 1,800,000, or equal to 13 $\frac{3}{4}$ %.

The sale, on the 19th January last, of the Indian and Colonial Exhibition properties was not a very successful affair, although there was a large number of bidders and spectators present. "Old London," which was so attractive a feature, and cost, it is said, £10,000, having been put together so as to admit of removal and re-erection, fetched £160 15s. The Indian Palace Durbar Hall, and the Prince of Wales' Pavilion were sold for £63.

A message by Reuter's Telegram, dated Melbourne, January 24th, informs us that the Dutch authorities in Java have declared the engagement of native labourers for service out of the country

to be a criminal offence, thereby putting a stop to their exportation to Queensland to work in the sugar plantations.

The *Indische Mercur* states on the authority of a Java publication, that a factory which sold its sugar at fl. 7.75, or at the most fl. 8 (13s. 4d.) per picul, (= to 11s. 3d. per cwt.) Quality No. 14, has made a net profit of fl. 60,000, or say £5,000. Alterations and improvements have resulted in a better yield of sugar than in 1885. The Sélonego factory had a crop of 910 piculs of cane per "Bouw," against 500 piculs in the previous year—a bouw is about $1\frac{2}{3}$ acres, and a picul $133\frac{1}{3}$ lbs.

A good deal has been said about "protection to American labour." The following will show how it works:—

Steel rails are now sold in the United States for from 37 to 38 dollars per ton. Two years ago they were sold for 27 dollars per ton. Increase in price, 10 dollars per ton. Commenting on this the *New York Herald* goes on to speak in this significant strain:—"Under this increase the wages of the workmen have been advanced about 2 dollars 70 cents per ton. The rest, or 7 dollars 30 cents per ton, is quietly pocketed by the capitalist employers. A million and a half tons of steel rails are produced annually in this country. Protected capitalist employers gain thus over 10,000,000 dollars out of the advanced price for their own share of protection. This is divided among the owners of eight steel rail mills. These capitalists are very urgent for 'protection to American labour.' Of course, 'protection to American labour' is a very good thing for the employers, but why don't the workmen get their share? or, if they don't, why not call it 'protection to American capitalists and monopolists?'"

The complaint has been that beet sugar, aided by foreign bounties, was crushing out our cane growers. The following, which we take from the editorial of *La Sucrerie Indigene*, of December 28th, 1886, puts the boot on the other leg:—

"We have seen that the Austrian sugar manufacturers have, at a meeting held lately, raised the question of closing their works for a year, in the hope of putting an end to the ruinous prices which characterise the present crisis. Not even this heroic expedient would save the beetroot sugar industry in the future, because the colonial production asks nothing better than a chance of developing itself, and if it is not restrained by

“surtaxes, from entering European countries, it will end by crushing the whole of the continental production.

“The struggle between the cane and beet has assumed an alarming aspect, since the creation of powerful associations has rendered practicable the application to the canes, the whole of the progress which the working of beets has enjoyed through the advances made in machinery and chemistry. It is our own mechanicians and our own men of science who are furnishing the improved weapons to our rivals, who are able to crush us.”

On pages 97 to 101 will be found a series of tables prepared by Messrs. F. Reid & Co., Liverpool, showing the yearly consumption, for the past 20 years, of the leading articles of commerce. Taking the article of sugar, it would seem, from these statistics, that the consumption in 1886 was less than in 1885 by $3\frac{1}{2}$ lbs. per head, and only $\frac{1}{2}$ lb. per head more than in 1884. We do not believe that there has been any actual diminution in the consumption in 1886, but that the difference of $3\frac{1}{2}$ lbs. is accounted for, or nearly so, by the abnormally low stocks in the hands of refiners, (our largest refinery in London is silent) wholesale grocers, and retailers, which are not brought into the account. 1 lb. per head, upon a population of 37,000,000, is equal to 16,515 tons.

In the consumption of tea and coffee there appears to be a slight falling off. On the other hand, it is satisfactory to note a decided increase in the consumption of rice, and of wool, cotton and silk. The decrease under the head of wines and spirits is slightly more marked than it was a year ago. The amount of the income-tax is 2s. per head more than in 1885, *but 17s. per head less than in 1876.*

We have pleasure in calling attention to a letter at page 68 from Mr. Milner, of Derby, giving some further account of the movement which was set on foot in that town in 1885, for the encouragement of the use of cane sugars, and which we noticed in the *Sugar Cane* for January, 1886. Mr. Milner is able to state that a marked change in the public taste, and an increased desire for cane sugars has been the result of their movement. Mr. Milner regrets, and we share in the feeling, that sugar machinists have not adopted similar measures for educating their neighbours on the question of cane *versus* beet.

We are glad to see that the question of establishing upon a general scale, central sugar factories, in Jamaica, is being discussed.

In an excellent letter, which has just appeared in the *Kingston Gleaner*, the writer sets forth the difficulties in the way of such a system being established, as also the advantages which would result from its general adoption. He estimates that a saving of 2s. 6d. per cwt. would be effected in the cost of production, and that the sugar so produced would be so superior in quality as to command a higher price by 5s. per cwt.—together, 7s. 6d. per cwt. This estimate, when tested by actual experience, would probably have to be modified;—but assuming the advantage to be 5s. per cwt., there is ample inducement for capitalists to enter upon the venture—the great obstacle is the want of capital. For the past five years, the production of sugar in Jamaica has not averaged 20,000 tons,—at one time it was our largest and finest sugar colony, and from it we received our largest supply of sugar. We give so much of the letter in question as refers to sugar and rum, at page 73; and we also append to it a list of the different sugar estates in Jamaica, now in cultivation, with the names of their owners, and attorneys, the number of acres to each, their production in 1885 of sugar and rum; for which particulars we are indebted to an excellent “*Hand-book to Jamaica, 1886-7*,” by A. C. Sinclair (of the Government Printing Establishment), and Laurence R. Fyfe (of the Colonial Secretary’s Office), and which can be had from Mr. Edward Stanford, 55, Charing Cross, London.

Mr. Kimber’s proposed resolution on the sugar bounties in the House of Commons for the 22nd of this month is similar to the one he placed on the notices of motion last session. This motion is most carefully worded, and demands the serious attention of all interested, and, in our opinion, every support on their part, as it precisely indicates the true solution of the sugar bounty question. The terms of this resolution are given in our present number.

We learn from *The Grocer* that Messrs. George Crosfield & Co., 6, Stanley Street, Liverpool, have been appointed sole agents in the United Kingdom for the sale of the Demerara grocery sugars of Messrs. Sandbach, Tinne & Co., the well-known merchants and planters, Liverpool and Demerara. Messrs. Crosfield conduct this new agency in conjunction with their present agencies for Messrs. Crosfield, Barrow & Co., sugar refiners, Liverpool; and Messrs. Bostock & Co., sugar refiners, Garston.

FINAL REPORT OF THE ROYAL COMMISSION ON THE DEPRESSION OF TRADE AND INDUSTRY.

We have before us the final report, dated 21st December, 1886, which has just been issued.

The first report is dated 7th November, 1885; the second report, in two parts, is dated March 31st, 1886; the third report is dated June, 1886; and the whole occupies upwards of 1800 folio pages.

The first report contained the evidence of Officials at the Board of Trade, the Customs, and the Foreign Office, with replies from the various Chambers of Commerce.

The second report, with appendix, occupying some 900 pages, contained notes of evidence upon the Coal and Iron Trades, several branches of the Textile Industries, Agriculture, and Shipping.

In conducting the examination of the several witnesses, the Commission endeavoured, in the first instance, to elicit their opinions as to whether the trade or industry they represented was, properly speaking, "depressed," and, if so, the precise meaning attached to that expression, the causes which have brought about its present condition, and any remedies which could be suggested. In this report is given the important evidence of Sir James Caird, the senior Land Commissioner for England, which took up an entire sitting.

The appendix, Part II., contained replies from about 57 Societies representing the interests of the working classes, and of reports from our representatives abroad with regard to the condition of trade and industry in foreign countries, forwarded to the Royal Commissioners by direction of the Secretary of State for Foreign Affairs.

The third report relates principally to the agricultural, the shipping, and the mining industries. In this report is given the evidence of our Sugar refiners and West Indian merchants, which we gave in the June, July, and September, 1886, numbers of the *Sugar Cane*.

The final report, now issued, contains the report upon the whole of the evidence, and is signed by 18 out of the 23 members of the Royal Commission, and of these 18, 11 have signed it subject to certain reservations and remarks set forth later on in the report, and of these 11, 6 have signed a statement in which they say that the report of the majority is too optimist, that it minimises the depression which the evidence shows does exist. Lord Dunraven, Messrs. H. Farrer Ecroyd, A. Muntz, and Neville Lubbock present a separate and lengthy report,

in which they give their reasons for declining to sign the majority Report.

The appointment in August, 1885, of this Royal Commission was looked upon at the time by many as a political "Fair-trade" move, on the part of the Conservatives, in view of the then impending General Election, and the consequence was that many, holding high positions in the commercial world, declined to have anything to do with it. The evidence, therefore, here given must be looked upon, to some extent, as partial; still it is very valuable. It is now forty years since Free-trade was established in this country, and the men who took an active part in that struggle—for it was a desperate struggle—are now but few in number. It ought not, therefore, to be matter for much surprise, if a large number of our vigorous men of business should be lacking in that feeling of veneration for free trade principles which is felt by those who fought hard for them, and know at what cost they were secured. They know that "depressed" as trade has been of late years, the depression is insignificant as compared with that which existed in this country previous to 1846.

Still, we repeat, the evidence here given is valuable. We have all that can be said in favour of "Fair Trade," and the weak points, or what may be considered weak points by our Fair Trade friends, in our Free Trade system fully disclosed.

After glancing over the voluminous evidence, the question which will naturally present itself is, "What will be its effect on actual legislation?" and we imagine the answer which most will give will be—Nil. We do not suppose we shall hear any more of "Fair Trade." It was to the Conservative Government that the Fair Traders looked. With Mr. Goschen in the Government, they must now have given up all hopes of their system being even so much as entertained.

As a contribution to the history of British Commerce for the past ten years it is invaluable.

We subjoin the concluding portion of the report of the majority, embracing the few recommendations the Commissioners are able to make.

CHEAPENING OF COST OF PRODUCTION.

The great object to be aimed at is, we need hardly say, the cheapening of the cost of production so far as it can be done consistently with the maintenance of sound quality and good workmanship. In the

competition for business, which has become so intense during the last few years, this will be the only means of securing success; and we have natural advantages in this respect such as are possessed by few of our rivals.

INCREASED VIGILANCE.

We think also that the increasing severity of the competition of foreign countries is a matter deserving more serious attention than it has received at the hands of our commercial and industrial classes. We cannot, perhaps, hope to maintain, to the same extent as heretofore, the lead which we formerly held among the manufacturing nations of the world. Various causes contributed to give us a position far in advance of other countries, which we were well able to hold for many years; but those causes could not have been expected to operate permanently, and our supremacy is now being assailed on all sides.

But if we do not possess to their full extent the same natural advantages as we formerly enjoyed, we have still the same physical and intellectual qualities which gave us so commanding a lead; and we see no reason why, with care, intelligence, enterprise, and thoroughness, we should not be able to continue to advance.

SEARCH FOR NEW MARKETS.

In order to do so, however, it is obvious that we must display greater activity in the search for new markets, and greater readiness to accommodate our productions to local tastes and peculiarities.

Even in matters of so little apparent importance as weights and measures it would seem that our disinclination to adapt ourselves to the requirements of our customers has not been without its effect.

TECHNICAL EDUCATION.

In the matter of education we seem to be particularly deficient as compared with some of our foreign competitors; and this remark applies not only to what is usually called technical education, but to the ordinary commercial education which is required in mercantile houses, and especially the knowledge of foreign languages.

DIPLOMATIC AND CONSULAR ASSISTANCE.

Suggestions have been offered by several witnesses as to the assistance which might be afforded to our trade by your Majesty's Diplomatic and Consular Officers abroad, especially in reporting information with regard to the requirements of foreign markets, and in answering inquiries from merchants and others on such matters.

We gladly recognise the efforts which have been recently made to utilise the services of these officers more effectually; but we doubt if their functions could be usefully extended in the direction referred to above. It is very important, having regard to their position and duties in foreign countries, that they should be neither directly nor indirectly engaged in commercial operations, and we fear that inconvenience would be felt if they assumed in any degree the character of agents for mercantile houses.

Any general information which they may acquire with regard to the trade of the district in which they reside, and which is likely to be generally useful at home, should, of course, be reported, and made public at once; and this is already provided for in their annual reports. But we should deprecate any change in their position which would bring them into closer relations with individual firms.

Nor do we think that it would be desirable for them to take a more active part in pressing particular schemes or enterprises set on foot by British traders in foreign countries. The representatives of some of our competitors may have been more active in this respect in some cases than our own consular and diplomatic officers; but such action must, we think, tend to lower the reputation of the country and to diminish the usefulness of the officer concerned.

As regards the reports themselves, we doubt if any useful purpose is served by requiring an annual report from each consulate. The consul should, we think, be instructed to report any information which appears to him to be of interest as soon as he obtains it, and should be as promptly published at home when received. A large proportion of the statistics and tables which now appear in the reports might be omitted without disadvantage, and the reports confined to matters of more immediate and practical interest.

COMMERCIAL GEOGRAPHY.

In connexion with the development of new markets for our goods, we desire to call special attention to the important subject of commercial geography, and to the letter from Commander Cameron, which will be found in the Appendix to this Report.

STATISTICS OF INTERNAL TRADE.

In the course of our inquiry we have frequently experienced the want of accurate statistics with regard to the details of our home trade. We would strongly recommend that steps should be taken to procure fuller information both as to the production of the leading

industries of the country, and as to the distribution of our industrial population.

If annual returns on some or all of these points could not conveniently be prepared, they might be issued at intervals of two, or at most three, years.

RAILWAY AND CANAL TRANSPORT.

With regard to the group of questions affecting the charges for railway carriages, we think (a) that greater facilities should be afforded to the public for readily ascertaining the rates which the companies profess to charge, together with any modification of those rates which they make in favour of any individuals, or any classes of their customers; (b) that a cheap and effective procedure should be provided for obtaining a legal decision on any disputed point, and for enforcing the decision, when given; (c) that greater attention should be paid to the development of the water communications of the country, and that no railway company should be allowed either directly or indirectly to control or own a canal; (d) that every facility should be afforded by Parliament for the construction of light railways or tramways in those parts of the country which may be found to be insufficiently supplied with the means of communication, or which are susceptible of further development in this respect.

LIMITED LIABILITY ACTS.

We refrain from making any specific suggestions for amending the law relating to limited liability; but we are of opinion that in some respects it is capable of improvement.

It is most desirable that the creation of unsound companies should be checked, and that in every case where the facilities afforded by the Limited Liability Acts are taken advantage of, the *bona fides* of the promoters should be, as far as possible, ensured.

Several proposals for the amendment of the Acts have been laid before us; but we think that the details of any new legislation on the subject would require to be further considered and discussed by those who have a more practical acquaintance than we possess with the working of the existing law.

To the suggestions which will be found in the evidence of the witnesses on this subject, we may add that the creation of unsound companies might be to some extent restricted if the fee for registration, which is now very low in proportion to the nominal capital embarked, were increased; and the attention of the Legislature

might, in our opinion, be advantageously directed to this point, both in the interests of the revenue and of legitimate trading.

CONCLUSION.

In conclusion, we desire to express our sense of the ready assistance which we have received in the course of our inquiry from the several bodies and individual witnesses whom we have consulted; and we would also commend to the careful attention of all classes of Your Majesty's subjects the valuable and complete collection of information as to the economical condition and prospects of the country which will be found in the appendices to our several reports, and a list of which is annexed to this document. We think that while, on the one hand, the information which we have been able to collect will tend to dispel much of the misapprehension which appears to prevail on the subject of our commercial position, and to encourage a more hopeful view of the situation, it will also show that if our position is to be maintained it must be by the exercise of the same energy, perseverance, self-restraint, and readiness of resource by which it was originally created.

If our labours should tend in any degree to the promotion of this result, we venture to think that they will not have been entirely thrown away.

The foregoing is from the Report of the majority. The following extract is from the Report of Lord Dunraven, Miss W. F. Ecroyd, F. A. Muntz, and Neville, and refers specially to Foreign Bounties:—

BUT FOREIGN BOUNTIES AND TARIFFS ARE THE CHIEF DISTURBING CAUSE.

The greatest and most permanent causes of the depression, which are undoubtedly, as before stated (paras. 28, 58-64, 76, 81, 82), the action of foreign bounties and tariffs, and the growing effect of directly or indirectly subsidised foreign competition. These are not natural difficulties, but difficulties artificially created by the legislation of foreign states; and they tend continually to grow, not only through the increase of the restrictions themselves, but much more through the circumstance that tariffs which in former years offered but a slight obstruction to trade, have become more and more prohibitory through the advance of the protected industries towards equality with our own.

PRODUCERS ARE POWERLESS TO OVERCOME THEIR INFLUENCE.

Nor can any efforts of producers, however intelligent or energetic, lessen these difficulties; for every improvement made by them is at once appropriated by their protected foreign competitors, through the purchase of English machinery, and the engagement for a time of English superintendents.

On the contrary, it is inevitable that any industry which is engaged in a hopeless struggle against insuperable difficulties must sooner or later fall into a condition of languor, and of decreasing ability to meet competition. Those engaged in it lose heart and hope; capital and talent are gradually withdrawn from it; and as it offers reduced remuneration and a diminished prospect of advancement to skilled labour, the quality of the labour employed in it tends continually to decline, and its productions deteriorate.

UNLESS PREPARED TO COUNTERWORK THEM, WE MUST ENDURE
THE DEPRESSION THEY CREATE.

The depression, then, so far as it arises from the permanent and growing causes just named, cannot fail to recur, after each interval of relief, with equal or increasing force; and this must be endured, unless the nation shall determine to counterwork by active measures the disturbing influences which are artificially produced by foreign legislation.

SUGAR BOUNTIES; COUNTERVAILING DUTIES DESIRABLE.

The most conspicuous, we do not say the most important, case is that of the sugar bounties. The abolition of these bounties is admitted to be desirable, for it has been the object of repeated efforts on the part of the Foreign Office. So long as the bounties are maintained, therefore, it is evident that the imposition of a countervailing import duty must be desirable. Its effect would be to restore to the producers of sugar in our colonies and in India, and to the refiners in this country, the just right of competition on practically equal terms, and to transfer to our own Exchequer the export bounties given by foreign nations. The position of the British consumer would be the same as if we had by negotiation obtained an equivalent reduction of the bounties, whilst in his quality of taxpayer he would be a gainer by the diversion of foreign money into our Exchequer, so long as the bounty-receiving importations continued.

A countervailing duty of one farthing per lb., or 2s. 4d. per cwt. on all foreign refined sugar and raw beet-root sugar would substantially effect the purpose.

CANE SUGAR MOVEMENT IN DERBY.

Masson Works, Derby,
January, 1887.

TO THE EDITOR OF THE "SUGAR CANE."

Dear Sir,—It will be within the recollection of your numerous readers that in the first issue of the *Sugar Cane* for 1886, there appeared a report relative to a movement on the part of the employees of Messrs. G. Fletcher & Co., Colonial Engineers, the object of which was the supplying of themselves, their families and friends with a pure cane sugar (not bounty fed). You were not only good enough to insert that report, but to comment most favourably upon it, and strongly urged the workpeople of other sugar machine makers to adopt a similar means of educating their neighbours on this question. We are not aware that your recommendation has been adopted by the workmen of other firms. Perhaps they are content to embody their protests in resolutions and deputations, but it is quite evident, as the Right Honorable Sir M. H. Beach, M.P., remarked at a conference on this subject last year in London, at which I had the honour to attend, "that while the grass grows the steed starves." We continue to believe in the wisdom and expediency of following up such protests by encouraging the consumption of pure unbounty-fed cane sugar, and that our efforts are warmly approved by several gentlemen in different parts of the country, in conjunction with a number of English refiners, was evident by the many kind expressions we received from them immediately on the appearance of the report in the *Sugar Cane*.

We feel, therefore, encouraged to forward you a brief account of the further progress of our movement.

Early in the year we were compelled to raise our capital from £60 to £150, and, in consequence of the increasing demand for pure cane sugar, we have found it necessary to still further augment that amount. It may be of interest to yourself and readers to be informed that our working capital is raised by 5s. shares, confined to the workmen, and on which we pay a small percentage.

Our turnover for the year has been quite equal to our anticipations, and, to us, is very gratifying, especially when we remember the interruption we have experienced in consequence of depressed trade in that branch of engineering in which we are engaged.

Our time for sale is limited to meal hours, and to the evening when work is over. Our esteemed employer takes much interest in the movement, and continues to afford us every reasonable facility for storage and sale.

Doubtless, much of our success is owing to the fact that we are able to keep in stock splendid samples of Demerara, loaf, and other refined sugars, which are guaranteed pure cane and free from bounty, and having just purchased six tons of splendid Demerara, which is meeting with a rapid sale, we expect that our results for the present year will be in advance of the year just closed. We are, therefore, prepared to deal either by wholesale or retail. Sir, since we inaugurated the present movement, we have witnessed a marked change in the public taste, and an increased desire for cane sugar, and, if we have done something to bring about this result, it is a stimulus to us to continue.

I need scarcely assure you and your colonial readers, that we are very sensible of the identity of our interests on this question, and of our sympathy with them in their efforts to obtain some redress from the Home Government, whose countenance to foreign bounties we consider unwise and impolitic.

We trust that the time is not far distant when we shall witness such a trade between ourselves and our colonies that will cement the federation of ourselves into that Greater Britain which is so earnestly desired, and which we are sure will prove to be the greatest protection against any foreign oppression.

Awaiting your favourable notice, and anticipating your obliging insertion in an early number of the *Sugar Cane*.

Signed on behalf of the Committee,

R. MILNER, Sec.

THE SUGAR MANUFACTURE IN AUSTRIA.

(Continued from page 33.)

In our last issue we gave, under the title of "The Sugar Manufacture in Austria," an abstract of three articles which had appeared in the *Journal des Fabricants de Sucre* from the able pen of M. Georges Dureau, the *redacteur* (not, as we incorrectly styled him, the correspondent) of that journal. These articles are being continued, and

although the details have no longer the general economic and statistical interest of the former contributions, inasmuch as they relate merely to the production of beets and the methods employed in the extraction of the sugar, we have thought it advisable to give a short summary of such portions as deal in any way with the cost of production, as they may be useful for comparison. It may be well again to point out that the facts relate exclusively to Bohemia, the largest sugar-producing district of the Austro-Hungarian monarchy.

We gather that the quality of the beets is inferior to that of the French and notable of the German roots. The tax not being levied on the roots, there is not the same urgent motive for requiring beets of a relatively high saccharine content. The greater portion of the beets is purchased of the farmers of the district surrounding the factory, either at a fixed price, or on the basis of the prices ruling for raw sugar during the months of October, November, and December of the current campaign. During last campaign from 75 to 90 kr. per metric quintal, or about 12s. 8d. to 15s. 3d. per ton, were paid in the case of purchases at prices agreed on at the time of contracting. This would appear to be considerably under those paid in former years, as is evident from a table drawn up by the well-known Herr Achleitner, of Vienna, according to which the average maximum price for the past ten years was 213 kr. per metric quintal, or 35s. 6d. per ton. The price paid for the beets contracted for on the basis of raw sugar prices in 1886 was, according to M. Dureau, 93½ to 99½ kr. per metric quintal, or say 15s. 6d. to 16s. 8d. per ton. The beets must have a maximum of saccharine content of 12% on the juice, be grown exclusively from seed furnished gratis by the factory, and delivered at scale free from soil and "topped" horizontally. None that have run to seed are received. Manufacturers are now only offering about 14s. 6d. per ton, and M. Dureau thinks that there is little likelihood of such commensurate reduction in the price of production or any counterbalancing relief from the proposed alteration in legislation as to stave off the inevitable diminution in production which such prices must occasion.

As regards the process of extracting the sugar, a very great change has taken place during the last ten years, during which the process mainly in use has been that of diffusion; but the diffusion vats, which in 1876 often had a capacity of as much as 945 gallons, now attain, as a rule, only that of 155 to 175 gallons. The Rillieux

process has proved highly satisfactory, having resulted in an enormous reduction in the quantity of fuel necessary. M. Dureau calculates the economy effected by the Rillieux process of heating, &c., as reaching 40% of coal in the case of quadruple apparatus, and 30 to 32% for those with the triple effect; he gives the results of his personal observation in the case of about fifteen large factories. Descriptions of the operations in two large works are given. The first is that of Saaz, not far from Prague, founded in 1871, and capable of working up about 240 tons of beets per day. The yield of beets per hectare (2½ acres) varies in different years between 12½ tons and 40 tons. The saccharine content of the beets varies according to the season between 10% and 18%. The factory possesses nine diffusion vats, with a capacity of 190 gallons each. The heat employed in this operation is up to 175° Fahr., and the water, acting under a pressure of about one atmosphere, is heated beforehand to 76° Fahr. The duration of the diffusion process is from 25 to 28 minutes.

The expenditure of steam is from 250 to 265lbs. per cwt. of beets, corresponding to a consumption of coal amounting to about 30% of the weight of beets. The cost of the coal delivered at the works, is from 3s. 9d. to 5s. per ton, and the expenditure of fuel per ton of beets varies between 1s. 3d. and 1s. 8d.

The second factory, the working of which is described at length is that of Nimburg, which works up 300 tons of beets per day. The juice of the beets must show at least 15° in the balling saccharometer. The price is determined on the basis of raw sugar prices as already indicated. In 1885 it amounted to 17s. 6d. per ton. For the current year it will only be 13s. 4d. There are nine diffusion vats with a capacity of about 230 gallons each. The water is heated to 85° Fahr. and the third, fifth, and sixth vats are worked at a temperature of 190° Fahr. In both the above factories the use of bone-black has been superseded by the carborate of lime process, resulting in a saving at Nimburg of 1s. 5d. per ton of beets, or about £2,000 for the quantity of beets worked up, viz., 30,000 tons. The manager states that he is very well satisfied with the Rillieux processes, but gives decided preference to the "quadruple effet," which has produced astonishing results in another factory (that of Schonhof) under his direction. The saving in fuel effected at Nimburgh has been 8½% of the quantity of beets worked up, equivalent to about 1s. 2d. per ton.

M. Dureau calculates that the application of the Rillieux process in more than one-third (80 out of 200) of the sugar factories in Austria-

Hungary is equivalent to an economy in fuel amounting to more than 2,800,000 francs, or £112,000 for a single campaign.

A calculation has been made by M. J. Kasalowsky of the expenditure of steam and coal in different methods of evaporation and heating the juice in an average manufactory such as that of Ouwal, where the triple, quadruple, and quintuple arrangements have been successively tried:—

	Expenditure of steam per 100 kilos of beet.	Percentage of coal con- verting 13 1-5lb. of water into steam.
Evaporation by double effect, juice heated by direct or by return steam, and with single boiling vat (<i>cuite à simple effet</i>)	141.28 kilos	.. 23.55
Evaporation by triple effect, juice heated by direct steam, and with single boiling-vat	111.58 kilos	.. 18.6
Evaporation by quadruple effect, juice heated by direct steam, and with single boiling vat.....	96.66 kilos	.. 16.11
Evaporation by triple effect, Rillieux process, juice heated by steam of the juice from the 1st and 2nd box, not heated before entering the 1st case, and with single boiling-vat	92.52 kilos	.. 15.42
Evaporation by triple effect, Rillieux process, juice heated by steam of the juice in the 2nd box, not heated before entering the 1st box, and triple boiling (<i>cuite à triple effet</i>), <i>i.e.</i> , with steam from the juice in the second box	*18.42 kilos	.. 13.77
Evaporation by quadruple effect, Rillieux process, juice heated by the aid of steam of the juice in the 1st and 2nd box, juice not heated before entering the 1st box and single boiling-vat....	82.63 kilos	.. 13.77
Evaporation by quadruple effect, Rillieux process, juice heated by the steam of the juice in the 2nd box, juice not heated before entering the 1st box, boiling with the steam of the juice in the 3rd case.....	71.89 kilos	.. 11.98

M. Dureau adds that a letter just received from Mr. Joseph Lexa, Prague, informs him that the processes above referred to should be called the Rillieux-Lexa system, Mr. Rillieux having projected the idea which Mr. Lexa developed and arranged.

* These figures are evidently incorrect; we would suggest 88.42 kilos. and 14.75 per cent. as being probably what was intended.

CENTRAL FACTORIES FOR JAMAICA.

In the *Gleaner* (Jamaica), November 24th, is a long letter addressed to the Committee appointed by the Society of Agriculture and Commerce. We reproduce that portion of it which makes special reference to the sugar industry of Jamaica:—

The question of establishing central factories for the manufacture of sugar and rum is engaging the attention of many persons in this island.

There are many difficulties which may impede such undertaking, chiefly of a financial character.

The bank rate of discount in Jamaica never varies; it is perpetually at 8 per cent. per annum, and all persons requiring funds for commercial or agricultural undertakings have to submit to this rate.

It is true that capital is obtainable from time to time for Government loans at 5 per cent., and not infrequently a premium given for such investments, but generally speaking this capital could not be invested in any enterprise that had not the Government guarantee.

In all countries more or less funds are available for investment in behalf of churches, schools, orphans' or widows' asylums, &c., at such rates of interest as the most secured guarantees can afford.

But in order to obtain, for any enterprise, capital subject to fluctuations, and giving no absolute certainty of a regular and uniform interest, something considerably more than the usual bank rate of interest must be promised by those who wish to promote an enterprise in Jamaica.

Only a few capitalists with spare means reside in the island, every person having his capital more or less invested in either grazing pens, household property, or sugar plantations.

To obtain English capital at from five to six per cent. per annum, the Jamaica colonist has to give to his merchants in England, as a *sine qua non*, his crops of sugar and rum, so that the English capitalists might have the benefit of the commissions derivable from its disposal in England, whither it is shipped consigned to such merchant, without which there would be no possibility of obtaining means, even with a mortgage on the property as a security for advances.

This system almost precludes the possibility of obtaining sufficient capital in Jamaica either for the central factories, or for the establishment of any other enterprise requiring large sums.

The impression, however, is very strong that the establishment of central factories would prove a great blessing throughout the island, and, the more the question is discussed, this conviction is the more firmly entertained.

Many proprietors of estates adjacent to each other, in several districts of the island, have conferred together, having in view the construction of a factory in the most central parts of such districts, each producer agreeing to sell his canes to the company formed for such enterprise; but it was found impracticable, as the agents of each producer in England would require, as usual, that the product of each property be consigned to them. How, then, would the planter sell his canes to the factory while such agents permitted him to draw, all the year round, for the cultivation of such property upon the district, understanding that the production thereof should be consigned to such agent for sale on commission.

It will be seen then that only in such districts where the resident proprietary are perfectly independent in circumstances that such a scheme can be carried out, and although there are many such proprietors they are not consolidated in any particular district, their possessions being more or less scattered throughout the island, rendering co-operation amongst them abortive.

The following estimate of the cost of management of twenty sugar properties of average production, compared with a central factory yielding the same quantity of produce as the entire number of estates, will show a great saving in the economy of management, as well as secure greater efficiency and a much better article of far greater value than is ordinarily obtained.

Cost of management of twenty sugar estates, making an average crop of 200 hhds. each.

	£	s.	d.
20 managers' salaries and partial maintenance, at £200 per annum	5,600	0	0
40 bookkeepers for the stillhouse, boiling house, and field, with maintenace, £105..	4,200	0	0
20 engineers at £60	1,200	0	0
Attorneyship of each property, £100	2,000	0	0
	<u>£13,000</u>	<u>0</u>	<u>0</u>

*Estimate of cost of management of a central factory, making
annually 4,000 hhds. sugar.*

	£	s.	d.
Chief manager's salary	600	0	0
Chief engineer's salary	400	0	0
Second engineer's salary	200	0	0
Two assistants, £100 each	200	0	0
Ten book-keepers, £120 each	1,200	0	0
Two accountants, £150 each	300	0	0
	<u>£2,900</u>	<u>0</u>	<u>0</u>

Saving in favour of factory in management above of £10,000; in other words, two pounds ten shillings per ton. The saving and other advantages are by no means confined to the economy of management.

The saving in fuel would be prodigious where the boiling process is confined to one establishment instead of twenty engines, twenty boilers and forty furnaces, for there are on each property a furnace for the boiling process and another for the distilling department.

In addition to these advantages arising from a co-operative system, which the establishment of a central factory brings into play, there is the additional advantage of having such machinery as will produce the best quality sugar worth at least £5 per ton beyond the low qualities produced by the Jamaica settlers, which, even after shipment continues to drain until it reaches its destination, where it is landed twenty per cent. less in weight, owing to its imperfect manufacture. It is, therefore, not to be wondered at, when, from similar circumstances, the result of manufacturing sugar at the neighbouring French islands by the "Usine," or central factory system has yielded thirty and forty per cent. per annum upon the capital. It is likely even to yield better results in Jamaica, as the value of land in this island is much below what it is in the French islands, and the cost of animals to transport the canes would also be much less, while the value of rum obtained from the molasses of the canes grown in Jamaica would be worth at least one-third more than what is derived from the molasses obtained in any other part of the world.

This result would arise from the flavour of the Jamaica rum, which is the finest produced, and is worth from sixpence to three shillings per gallon more than the rum made at either the French or other British islands.

The proportion of rum made from a given quantity of canes in proportion to the sugar produced from the same quantity by the use of centrifugal machines, now being employed in Jamaica, would not be less than three-fourths,—say three thousand puns. of rum to four thousands hds. sugar. The probabilities are, however, that there would be a larger return of rum, calculating then the value of Jamaica rum over any other is 6d. per gallon, though actual experience has proved it to be on an average at least one shilling, the additional profit on the 3000 phns. rum, each of 100 gallons, over the profits of a similar undertaking established elsewhere is £7,500.

In the course of time there is little reason to doubt that the beet root production of sugar on the continent of Europe, is likely to drive out of the field the cane producers of sugar in the colonies, unless the system of cultivation and manufacture of the latter undergo a great change.

In fact the scientific management required in the beetroot factories must be adopted in the sugar-cane producing countries, without which the sugar produced from the cane will gradually be driven from the European markets.

It will be saying too much to prognosticate a similar result in America—indeed the conditions are widely different.

In Europe the beet sugar is actually produced in the markets where it is consumed, and not subjected to any serious charge for its transportation, either in freight, insurance, loss in weights, export duty or to any other charges to which the colonial and foreign cane sugar is liable in the ordinary way; while the difference of duty between the best manufactured article produced in Europe, and the common production of the colonies, has dwindled down until there is scarcely an appreciable difference left, while there is every probability from the principles laid down by ruling statesmen that sugar will cease to be taxed altogether, and the common production will thus be placed, without the slightest protection, in competition with the purest and best article as manufactured in Europe, and which even, unlike the West Indian production, will not be subjected to charges that must, apart from all other drawbacks, be an ever attendant disadvantage on the latter.

There is every reason to believe that the beetroot production on the continent of Europe will continue to prosper and be adequate to supply the entire European markets and thus drive out entirely the

cane sugar from the severe competition unless steps be taken to prevent such a result.

In the United States there is a large difference in the duty upon raw muscovado sugar and the refined article.

The consumption of sugar is increasing rapidly in the United States and even now it exceeds the consumption of that article in the United Kingdom annually, this consumption will have astonishing development, for the population of that country is constantly increasing not only by the usual natural causes, but by the extensive emigration from the United Kingdom and other European countries. The rate of wages for labour in the United States enable the humblest artisan to consume sugar as soon as he becomes a citizen of the latter country.

It stands to reason then that the time is not far distant when the United States of America will become the best market for West India sugar, and will be able, also, to consume all the West Indies can produce. This interchange of commodities between the United States and the West Indies will continue to grow; even now the latter are supplied with wheat, flour, beef, pork, butter, lard, and many manufactured articles of the western continent, while the export of sugar from the West Indies to the United States has been increasing annually, and if it has not reached more important dimensions it is owing to the advances made by British capitalists to sugar producers in the West Indies, who now begin to find that they could do much better were they not compelled to ship to the British markets; and the time is not far distant, when British capitalists will refuse to make such advances, as the increasing production of beet-root sugar disenabled them to pay all the charges consequent upon the importations, and make a sufficient return to cover a fair allowance to the producer.

If this has not already taken place it is owing to the very high price of rum produced in the West Indies, and shipped to British markets as part of the production of a sugar plantation, but which cannot be considered a normal state of things, however acceptable it might be to West India producers.

It may be out of place to point out for consideration that the continued increase of beet production will in all probability decrease the production of wheat on the European continent. The United Kingdom requires very large supplies of the staff of life, even in favourable years, and should the supply, through any cause be diminished

it cannot but prove detrimental to the interests of the mother country.

In addition to this threatening result, the prospect of the shipping trade now largely carried on by British vessels will be likely to be interfered with, if all Europe should be supplied with sugar produced there instead of from the British colonies and distant foreign countries.

If these deductions are reasonable, and careful investigation and actual experience will prove that they are so, it behoves the mother country to carry into effect a remedy which will alter the course of events without deviating from the ruling commercial principles adopted by Great Britain.

The leading statesmen of England have followed for the last quarter of a century a policy to unfetter in every way the industry of the country in order to develop it by every possible encouragement from the Government.

All raw materials in every manufacture have been admitted free of duty, while a moderate duty upon some manufactured articles has been retained. But the same policy has not been pursued with regard to raw muscovado sugars.

To admit that description free would be in exact accordance with the principles which have been maintained in respect to all other raw materials required in the manufactures of the kingdom, while a moderate duty could be permanently and fairly charged upon the refined article. If this system could be termed a protective one, so could all duties be so considered that are now levied upon manufactured articles, when the raw material required for their manufacture be admitted free of duty.

The free admission of all muscovado sugar, with a small duty of two shillings retained upon the refined article, would get rid of the difficulties now existing from the imposition of duties upon the raw article on which, under the present scale, the duties vary.*

This procedure would be sufficient to check partially, but not entirely, the production of the beetroot. It would then be requisite to assist the British colonies to produce a better quality of sugar at a cheaper rate, and this can be done by the establishment of central factories.

The competition with beetroot sugar is not now on equal terms

* We do not understand this paragraph. The writer of it cannot surely be under the impression that there are any duties upon sugars imported into this country? They were abolished in 1874.—Ed. *Sugar Cane*.

with the cane production of the colonies; the former having the natural advantages of being consumed in the neighbourhood of its production, as well as the greater skill employed in its manufacture.

But if the same scientific appliances were used in Jamaica, and the article produced upon a larger scale in a single establishment, where all the latest improvement could be adopted under the supervision of skilled overseers, there is abundant evidence to show that a superior grocery description of sugar might be produced considerably cheaper than the inferior descriptions now made, and also a larger percentage of the juice could be obtained from the more efficient crushing of the canes, as also less waste than is now the case from the admittedly imperfect system of boiling in open pans.

All these improvements cannot be carried out by sugar estate proprietors making but two hundred hhds. per annum, which is even much above the average production as will be seen by the following calculation.

It is asserted that there are but three hundred sugar estates in this island.

Three hundred estates * producing each two hundred hhds. would, if correct, realize the average yearly crop of sixty thousand hhds. The actual crop was for the year 1872 thirty-five thousands hhds. or thereabouts, and for the last five years that production has seldom been exceeded. It will be seen then that this estimated annual average yield for each estate far exceeds the actual fact; but while it should be borne in mind that there are many properties producing much less than this estimated average, there are some which produce from two hundred and fifty to four hundred hhds., and it is a noticeable fact that such properties afford far more profitable results than the smaller ones, even taking into consideration the larger outlay.

In Trinidad and Demerara there have been established large plantations, and central factories are now being constructed and will shortly be completed.

In Guadaloupe and Martinique, central factories have been in existence for some few years, and practical proof has been given of the general prosperity that they have created in every district where they have been established; while the proof has not been wanting of their having yielded immense profits to the shareholders.

Jamaica has been, as usual, very backward, owing to its want of capital and the difficulty of obtaining it in England.

* For a list of the sugar estates in Jamaica, now in cultivation, with names of owners, &c., see pages 84-89 of present number.

An impression is in some instances entertained that this backwardness is caused by the existing form of Government; but nothing could be more fallacious—indeed the contrary is the fact. Since the present form has been inaugurated a much greater confidence has been evinced than was formerly entertained by British capitalists, and indeed that confidence is largely entertained in the island itself, for while the Government securities are eagerly sought after with only five per cent. interest, and in many cases a premium offered for such investments, under the former require that they were at a discount with the then legal interest of six per cent. per annum, nevertheless the position of Jamaica is exceptional as compared with the other thriving communities of the West Indies.

For a long period past it has had a bad reputation, the lands of absent as well as resident proprietors were taken possession of by squatters, yielding no income to their proprietors, and it will be really admitted that this was not a very encouraging circumstance to draw capital from foreign sources, while the land was partially cultivated and yielded little more than a livelihood to the squatting possessors.

This mammoth evil has been grappled with in the most statesman-like manner by the Governor, and is now gradually disappearing from the face of the country, and the good effect of this great measure can scarcely be exaggerated. Many thousand acres of arable land will fall to the Government from a variety of causes, while many thousand acres will be liberated from the squatters and handed to their rightful owners.

The time is, therefore, most opportune to give every encouragement to the establishment of central factories; for without Government aid it is doubtful whether this system of concentrated labour will be put into execution. The Government need only assist in the formation of a single factory, as the results therefrom are likely to be so very encouraging that there will be no necessity for further aid, as British capitalists will ultimately seek such investments, and similar factories will be established in every district of the island. There are obvious reasons why a Government should not take in hand such investments on its own account, and there is but one way to render such assistance as will give the required encouragement. It is that the Governor should pass a measure authorizing the guaranteeing debentures of an approved company, formed for the purpose of completing a central

factory; the interest to be paid half-yearly, a moiety of the loan in five years, and the other moiety in ten years. Say that under the following circumstances a company were formed to construct a central factory, with a supposed capital of £100,000, half of that sum to be paid by shareholders at once, and the balance to be called for, if required, in four years and nine years, to be available to pay debentures, should the profits of the company be insufficient to do so. No debentures to be issued or guaranteed until the central factory has been completed, and the claim of Government on the property and plant to remain in force until the last debenture is paid off.

This would ensure for the company cheap money for advances to small settlers and for cultivation generally, and also for the general improvement of the undertaking. There would then be sufficient encouragement to cause the application of this capital, while the indebtedness to the Government would be fully secured by its actual ownership of the entire property of the company, and the liability of each shareholder, were that needed. The company should purchase a sufficient area of land, so that it might erect in the centre thereof the factory, and in four opposite directions a tramway of five miles each way, and each terminating with a depôt for the purchase and weighing of canes, while within this area cane production can be carried on under the management and for the special benefit of the company, until the lands could be rented out to parties willing to cultivate them, and to sell the canes to the company.

The Government should have some controlling influence over the company by regulating the price to be allowed for each ton of canes, and as the five or six per cent. given by the Martinique company upon the weight of the cane delivered, yielded well to the company, and also was satisfactory to the producer, such a basis might be deemed a fair guide.

The arrangement was payment in kind, but the money value given by the company was based upon the actual value of the sugar, which being of the finest description was worth about twenty pounds per ton.

The small settler obtains for his sugar, imperfectly made by his rude manufacture, about fourteen pounds per ton; nor does he get as much as five per cent. from his canes, if, therefore, he were saved the expense of manufacturing under the system of remuneration, he would actually obtain six pounds per ton additional for all the sugar

his canes produce even when such sugar was manufactured at the expense of the company without any deduction whatever, thus learning him to confine himself to the production of the best canes without the investment for the rude appliances he now possesses.

If there are five thousand what are called John Crow Mills owned by the peasantry, the cost of which, with all appliances, could not be less than £15 each, there would be actually expended by them £75,000. It might be said then, that if the peasantry can raise so much capital, why are they not co-operated with by the more intelligent of the community?

The answer to such query would be fairly stated by explaining that the small settlements are scattered throughout the island, and, under the circumstances, co-operation would not be sufficient to carry out a great work in any one district.

But the company's shares might be fixed at two pounds each, thus giving an opportunity for the small settlers to become shareholders. It would be a great practical lesson to the peasantry and would teach them to invest their means in an intelligent manner, instead of burying in their grounds specie and bank notes, which is too often the case and has been done for many years past.

The establishment of central factories in Jamaica would prove a substantial benefit to the peasantry and small settlers, and render them more independent than they are at present, which could not fail to have an injurious effect on the interests of the large proprietary body. Such a great encouragement to divert labour from such sources, should be met by a continuous stream of immigration from Calcutta, China, and other places, and thus prevent the injury to one interest for the benefit of the others.

Besides which the extended cultivation and increased export, which the establishment of central factories will assuredly occasion, may reduce the production of the estates already established and in cultivation, by curtailing the amount of labour at present available to them, which in many districts is now even insufficient, without being supplemented by coolie immigrants.

Supposing due encouragement be given, as suggested, for the establishment of central factories, as also for the continuance of immigration upon a larger scale than hitherto, this island will be rendered truly prosperous and capable of producing sugar at such a rate, as to hold its own in all the markets of the world that are

supplied with the beetroot production. At any rate there will be room for expansion which is not now the case; for without a more efficient and economical system be set in motion, which is comprised in the central factory scheme, there is every reason to believe that the sugar production in this island will decrease until the further development of the consumption of the article in the United States.

It will therefore be a wise policy on the part of the Government, to set in motion the immediate establishment of one central factory, by affording the necessary encouragement; and the result will most assuredly prove that any further extension might be safely left to work out its own future; as much wealth in England will then be obtainable, and in every district a large factory will be constructed to take the place of the present wasteful system that needs only a successful experiment of the former system, to be "entirely abolished as belonging to a past age."

HOME CONSUMPTION IN THE CLYDE PORTS.

The following figures, which we take from Messrs. William Connal & Co.'s Circular, show how very small—not 7 per cent.—is the quantity of British sugars refined in the Clyde:—

	1883.		1884.		1885.		1885.
	Tons.		Tons.		Tons.		Tons.
West India	13,100	..	14,718	..	11,266	..	9,743
Mauritius	5,809	..	1,929	..	2,705	..	6,797
Brazil	8,251	..	2,012	..	927	..	965
Cuba and Port Rico ..	6,787	..	1,823	..	10,801	..	2,158
Beet	113,288	..	141,952	..	157,036	..	121,873
Java	92,249	..	72,976	..	58,462	..	93,538
Surinam and Foreign..	5,657	..	5,936	..	627	..	690
	<u>245,141</u>		<u>241,346</u>		<u>241,824</u>		<u>235,764</u>

It will be seen that Beet constitutes 50 per cent., and Java 40 per cent. of the entire consumption.

Name of Estate.	Owner.	Attorney of Owner.	Extent in Acres.		Description of Mill whether wind, water, steam, or cattle.	Process of Manufacture, whether by Vacuum Pan, Centrifugal Apparatus, &c.	Crop in 1885.	
			Canes in Cultivation.	Grass, Woodland, and Runnate.			Hds. Sugar.	Plns. Rum.
ST. ANDREW.								
Constant Spring	J. Savers	E. G. Kerridge	218	2,267	Steam	Centrifugal	175	156
Mona	Louis Verley	Wm. Berry, senior	300	1,872	Water	"	154	103
ST. THOMAS.								
Leith Hall	Thos. Daniel	D. J. Davis (Lessee)	158	972	Steam	Common Process	80	55
Pltn. Garden River	Heirs of Kelly	D. J. Davies	250	950	Steam & water	"	80	120
Wheelerfield*	The Colonial Co., England.	J. Harrison	20	880	Water	"	6	20
Hordley	James Harrison	"	293	1,411	Steam & water	"	200	95
Amity Hall	James Harrison	Richard Evans	300	951	Water	"	200	95
Duckenfield	E. H. T. Hawkins	"	300	1,700	Steam & water	"	150	90
Golden Grove	Lady Huntingtown	D. J. Davis (Lessee)	300	1,994	"	"	200	200
Lyssons	Chas. Levy	O. H. Levy	207	3,145	Steam	"	186	114
Retreat	Samuel Shortbridge	C. E. Sendamore	136	1,061	"	"	125	50
Belvidere	Heirs Count Freeman	D. J. Davis	226	2,066	Water	"	190	132
Hall Head	J. H. McDowell	W. S. Richards	150	2,472	"	"	150	81
Blue Mountain	Sir William Fitzherbert	W. S. Richards (Lessee)	173	879	Steam	"	110	53
Serge Island	Chas. Levy	Chas. H. Levy	400	1,321	Water	"	228	114
Coley	"	"	263	702	"	"	150	85
Norris	W. S. Richards	"	150	1,256	Water & steam	" & Centrifugal	150	61
Albion	J. S. Carson	W. S. Richards	350	4,626½	"	Vacuum Pan and	200	189
PORTLAND.								
Burlington	G. Solomon & Co.	R. Valdes	160	340	Steam	"	115	132
Spring Garden	W. B. Espeut.	"	40	2,360	Steam & water	"	40	5
Woodstock	P. A. Moodie & Co.	G. W. Middleton	55	1,370	Water	Common Process	40	44
ST. MARY.								
New Ramble	Hon. M. Solomon	"	210	1,510	Steam	Wetzel Pan, Centrifugal, &c.	280	260
Trinity	J. Pringle	"	100	836	"	"	130	50

* Since abandoned.

Llanrumney	J. C. Melville	36	983	Steam	Aspinal Pan, &c.	52	33
Ballards Valley	Colonel Dauley	140	1,38	"	Wetzel Pan, Centrifugal, &c.	120	65
Nonsuch	Estate late Hon. I. Levy	230	2,263	"	Steam Clarifiers	130	30
Water Valley	Mrs. W. Macdonald	21	2,210	"	"	50	10
Orange Hill	Estate late Hon. I. Levy	347	442	"	Wetzel Pan, Centrifugal, &c.	203	116
Agualta Vale	"	200	696	"	"	125	70
Gray's Inn	Henry Braham	430	1,576	"	"	430	215
Gibraltar	Wilnot Westmorland	163	797	"	"	240	170
Her-Boreale	Harvey & Bourke	33	1,475	"	"	42	8
Dover	J. C. Melville	150	1,287	"	Aspinal Pan	130	45
Brimmer Hall*	Abandoned	36	..	" .. .. .	" .. .. .	..	..
ST. ANN.							
Windsor	John Cameron	161	529	Water & steam	Common Process	93	95
Duax Hall	Henry Sewell	300	1,238	"	Helical and Aspinal Pan	200	200
Seville	H. P. Thompson	102	2,130	Water	Open Battery of Boilers, &c.	69	63
Llandover	Heirs or Wolfe	324	2,264	"	"	258	180
Richmond	Bernal Family	430	1,387	"	"	241	148
Orange Valley	H. J. Bagrove	100	3,210	Steam	Wetzel Pan and Centrifugal	71	52
Bengal	Uttin T. Todd, senior	142	1,140	Water	Range cured	76	50
Greenock	Heirs of John Anderson	150	913	Steam	Ordinary Process	313	182
Cave Valley	Henry Sewell	191	871	"	Helical and Aspinal Pan	330	273
Goshen	Hawthorne & William	210	1,278	"	Common Process	84	38
TRELA WNY.							
Arcadia	Henry Sewell	240	1,231	Steam	"	91½	61
Bryan Castle	Dr. A. V. Proctor	190	1,412	"	"	63	80
Brampton Bryan	"	154	1,181	"	"	77	58
Braco	C. H. Gordon	246	1,608	"	"	89	40
Cambridge	Elizabeth Thomson	180	785	"	"	125	106
Chester	William Gentles	130	918	"	"	51	62
Dundee	Hon. W. Kerr & Mrs. D. Kerr	187	863	"	"	61	29
Etingdon	L. C. Shirley	209	861	"	"	94	89
Fontabelle	C. H. Stewart	150	1,354	Water	"	78½	78
Georgia	J. W. Gordon	240	877	Steam	"	109	99
Green Park	Heirs of Atherton	340	1,725	"	"	203½	132
Gales Valley	Ed. M. Gale	167	2,244	"	"	146	100
Golden Grove	Miss A. M. Jarrett	160	1,490	"	"	78	87
Good Hope	F. R. Coy	150	1,613	Steam & water	"	96	72
Hyde Hall	L. C. Shirley	202	1,436	Water	"	137	120
Hyde	Trustee, H. Sewell	300	3,528	Steam	"	206	164
Hopewell	Stevling Brothers	120	792	"	"	92	67
Harmony Hall	G. P. Dewar	154	952	"	"	21	18

* Included with Trinity.

SUGAR ESTATES IN CULTIVATION IN JAMAICA, 1884-85.—Continued.

Name of Estate.	Owner.	Attorney of Owner.	Extent in Acres.		Description of Mill, whether wind, water, steam, or cattle.	Process of Manufacture, whether by Vacuum Pan, Centrifugal Apparatus, &c.	Crop in 1885.	
			Canes in Cultivation.	Grass, Woodland, and Rubinate.			Hds. Sugar.	Phns. Rum.
TRELAWNY, continued.								
Hampstead	William Gentles	.....	125	2,750	Steam	Common Process and Asphal..	74	71
Kent	Miss A. M. Jarrett	.....	74	934	"	" " & Centrifugal.	18	10
Lottery	Henry Sewell	.....	250	1,810	"	"	130	110
Long Pond	J. B. Sheriff	.....	180	2,146	"	"	117	107
Lancaster	C. H. W. Gordon	.....	221	1,105	"	and Asphal..	57	61
Nightingale Grove ..	Mrs. A. Wilson	.....	120	799	"	& Centrifugal.	42	38
Oxford	C. M. Barrett	.....	180	3,939	"	"	67	49
Orange Valley	W. L. & H. J. Kerr	.....	236	1,559	"	"	153	98
Swanswick	G. R. Clarke	.....	288	2,356	"	"	151	141
Steelfield	Trustee, H. Sewell	.....	126	836	"	"	62	70
Spring	Richard Moss	.....	70	788	Water	"	10	43
Tilston	Miss A. M. Jarrett	.....	182	1,836	Steam	"	98	86
Vale Royal	Henry Sewell	.....	246	1,032	"	"	176	138
ST. JAMES.								
Eden	J. W. Parkin	.....	80	814	"	Ordinary Open Battery..	78	60
Providence	DeB. S. Heaven..	.....	155	911	"	Wetzel Pan	125	55
Ironshore	Hon. Wm. Kerr	.....	180	970	"	"	151	108
Spring	Matilda Williams	.....	137	890	Steam & water.	Ordinary Open Battery	50	37
Tryall	Lorenzo Hall	.....	160	965	"	& Centrifugal.	44	40
Running Gut	Jno. Lawrence..	.....	162	605	"	"	42	46
Rose Hall	Geo. Robertson	.....	157	462	Water	"	64	58
Cinnamon Hill	Geo. Robertson	.....	180	1,275	"	Battery	105	64
Success	C. D. Wittingham (Lessee)	.....	73	702	"	"	15	40
Belfield	A. C. Houchen (Lessee)	.....	162	1,183	"	"	67	76
Hampden	L. C. Shirley	.....	144	1,301	Cattle	"	83	84
Lima	C. W. Sterling	.....	160	2,462	Steam	& Centrifugal.	80	83
Content .....	"	.....	160	1,366	"	Battery	123	81
Windsor Lodge .....	"	.....	50	1,008	Mules..	"	67	32

Gullsbro'	Hon. W. Kerr	DeB. S. Heaven	92	484	Steam & water	Ordinary Open Battery	97	59
Latum	William Murray Floyd and Capt Robert Peel Floyd.		214	1,426	"	Wetzel Pan	286	186
Irwin	Hon. J. W. Fisher (Lessee)	A. O. Houchen	135	1,811½	Water	Ordinary Open Battery	130	76
Friendship	G. L. Phillips		80	559	Water & steam	"	44	25
Retirement	J. W. Parkin (Lessee)		60	1,467	Water	Wetzel Pan..	85	39
Fairfield	J. W. Parkin		238	312	"	"	138	83
Catherine Mount	Miss Jarrett	Hon. Wm. Kerr	77	423	"	"	70	42
Catherin Hall	Peter McFarlane		266	780	"	"	252	194
Unity Hall	Hon. William Kerr		70	300	"	"	28	15
Wiltshire	J. W. Parkin		95	1,149	Steam	Wetzel Pan..	58	30
Anchovy	Dutton Trench		200	1,073	"	"	156	248
Hazelymph			151	1,097	Water	Ordinary Open Battery	85	68
HANOVER.								
Chester Castle	A. E Cooke	DeB. S. Heaven	105	620	Steam	Old Process	95	52
Golden Grove			138	2,370	"	"	135	94
Content	John Hodson		100	1,202	"	Centrifugal	70	69
Copse	Heirs R. Hind	G. L. Phillips	221	1,680	"	Old Process	102	67
Round Hill	G. F. Lawrence	Wm. Kerr	150	1,139	"	"	103	54
Flint River	Heirs R. Hind	J. M. Mills (Lessee)	78	972	"	"	54	40
Tryall	J. W. Parkin		200	1,984	Water	"	161	134
Mosquito Cove and Barbican.	Frederick Topper		159	822	Wind	"	118	29
Point	D. T. Mudie		125	908	Steam	"	120	90
Vickers & Sadler	H. Davis & Son		163	1,878	"	"	200	150
Riley			110	392	"	"	104	94
Houghton Court	A. Watson Taylor	J. H. Clerk	200	1,205	"	" and Centrifugal	189	148
Orange Cove	Jacob Jackson	Joseph Shearer	184	240	"	Centrifugal	132	91
Spring Valley	Hawthorn, Sheddou & Co.	E. J. Sadler	170	1,483	"	Wetzel Pan..	180	98
Prospect	Mrs. Cooke	"	140	1,330	"	" and Old Process	90	90
Houghton Hall	Hawthorn & Watson	"	103	800	"	"	80	55
Phenix	Wm. Farquharson	"	100	484	"	"	85	36
George*	H. Davis & Son		50	1,350	Water	"	"	"
WESTMORELAND.								
Albany	Anthony Oharley		170	622	Steam	Centrifugal	123	106
Belleisle	Hon. Wm. Vickers	H. A. Vickers	400	234	Steam & water	Vacuum Pan	200	228
Blue Castle	Eustace Greig	E. J. Sadler	165	1,420	Steam	Centrifugal	168	145
Blackheath	Eustace Greig	"	280	2,203	Water	"	262	194
Carawina	Mrs. E. Cooke	"	120	1,476	Steam & water	"	80	51

* Recently resuscitated.

SUGAR ESTATES IN CULTIVATION IN JAMAICA, 1884-85.—Continued.

Name of Estate.	Owner.	Attorney of Owner.	Extent in Acres.		Description of Mill, whether wind, water, steam, or cattle.	Process of Manufacture, whether by Vacuum Pan, Centrifugal Apparatus, &c.	Crop in 1885.	
			Canes in Cultivation.	Grass, Woodland, and Ruminant.			Hds. Sugar.	Phns. Rum.
WESTMORELAND, <i>continued.</i>								
Cornwall ..	Col. Lushington	E. J. Sadler	207	2,531	Water	Centrifugal	201	137
Charlottenburg ..	Anthony Charley	"	210	1,350	Steam	"	101	97
Friendship ..	C.W. Eaves & Co. & E.J. Sadler	E. J. Sadler	175	1,477	Water	"	192	205
Frome ..	Hon. Wm. Vickers	H. A. Vickers	200	605	"	"	195	100
Fort William ..	Heirs of Admiral Hay	E. J. Sadler	221	2,327	"	"	201	185
Fontabelle ..	H. A. Vickers	"	300	1,046	"	"	267	214
George's Plain ..	Sarah Watt	Wm. Ewen	270	2,427	Steam & water	"	190	127
Grandvale ..	David King	"	300	3,805	Steam	"	340	128
Glasgow ..	Helen Whiteflocke	"	220	645	"	"	222	202
Masemure ..	Anthony Charley	"	643	1,147	"	"	343	184
Mount Eagle ..	Richard Burgess	Rev. H. Clarke	226	2,330	"	"	233	172
Mint ..	Mrs. A. H. Sinclair	William Ewen	178	2,137	"	"	235	143
Meysersfield ..	Eustace Greig	E. J. Sadler	265	3,237	"	"	174	174
Mesopotamia ..	"	"	242	2,396	Water	"	269	219
New Hope ..	Alexander Stewart	John Hudson, junior	200	1,765	Steam	"	148	107
Retrieve ..	"	"	200	1,332	"	"	189	117
Retreat ..	Hawthorn, Sheddou & Co.	E. J. Sadler	200	2,354	"	"	181	158
Roaring River ..	Heirs of Admiral Hay	Thomas Cridland	162	872	Water	Ranger Cured	120	103
Shrewsbury ..	Lady S. Seymour	E. J. Sadler	270	2,283	"	Centrifugal	280	230
ST. ELIZABETH.								
Appleton	Wm. Hill	"	54	6,249	"	Ordinary Process	"	178
Bogue ..	Foster	DeB. S. Heaven	65	6,505	"	"	50	100
Elm ..	J. M. Farquharson	"	53	4,671	"	"	25	121
Holland ..	Gladstone & Co.	J. M. Farquharson	206	4,923	"	Weibel Pan and Centrifugal	200	230
Ipswich ..	"	DeB. S. Heaven	70	1,935	Steam	Ordinary Process	52	107
Mexico and Island ..	Estate of Arthur Parcells	John Calder	65	1,453	Cattle & water	"	100	50
Y.S. ..	"	DeB. S. Heaven	136	5,864	Water	"	116	112

CLARENDON.				Albert James	346	287	Steam	Centrifugal..	165
Amity Hall..	John Young	..	..	Albert James	346	287	..	Centrifugal..	181
Bensonton Vale	J. W. McKenzie	..	..	Q. Logan	14	41	..	Common Process..	15
Bog ..	A. Pawsey ..	..	..	R. C. Gibb	407	3,303	..	Centrifugal..	297
Carlisle ..	J. M. Gibb ..	..	..	Thos. Evans..	200	706	..	Common Process..	293
Caswell Hill	H. T. Ronaldson	..	..	J. Fox ..	160	1,948	..	"	143
Denbigh ..	Lord Penrhyn	..	..	John McGregor..	318	5,021	..	"	69
Dry River ..	J. Dingwall	..	..	E. C. Elliott ..	149	930	..	"	128
Dunkleys..	Geo. Solomon & Co.	..	..	Thos. Ellis ..	152	1,134	..	"	1
Danks ..	J. M. Farquharson..	..	..	Quintin Logan	170	1,641	..	"	50
Gibbous ..	G. P. Williams	..	..	W. Jump ..	122	512	..	"	30
Greenwich ..	C. J. Ward..	..	..	E. C. Elliott ..	250	810	..	"	194
Halse Hall	H. T. Ronaldson	..	..	Thos. Ellis ..	195	4,151	..	Centrifugal..	104
Hill Side ..	F. G. Harvey ..	..	..	E. C. Elliott ..	255	2,229	..	Vacuum Pan..	22
Money Musk	C. J. Ward ..	..	..	Quintin Logan	376	1,771	..	Centrifugal..	66
Moreland ..	J. H. Mitchell	..	..	W. Jump ..	400	2,852	..	Common Process..	100
New Yarmouth..	E. C. Elliott (Lessee)	..	..	E. C. Elliott ..	180	672	..	"	83
Parnassus..	Col. G. W. Dawkins	..	..	Thos. Ellis ..	357	3,528	..	"	223
Perrins ..	H. T. Ronaldson (Lessee)	..	..	Wm. Jump ..	200	1,025	..	"	190
Pusey Hall ..	D. B. Callaghan	..	..	E. C. Elliott ..	259	1,311	..	"	129
Raymonds ..	Estate of J. Harvey	..	..	Thos. Ellis ..	200	500	..	"	176
Rock River ..	John Scully ..	..	..	Wm. Jump ..	134	1,578	..	"	53
Suttons-Chesterfield.	Col. W. G. Dawkins	..	..	Quintin Logan	230	1,143	..	"	70
Savoy ..	J. W. Kemp ..	..	..	H. T. Ronaldson	100	574	..	"	145
Sevens Plantation	J. Grinan ..	..	..	..	240	3,926	..	"	116
St. Jago ..	J. H. Mitchell	..	..	..	240	7,250	..	"	92
Whitney ..	E. C. Elliott (Lessee)	92	3,171	..	"	60
Yarmouth ..	T. P. Williams	100	1,275	..	"	200
								"	145
								"	264
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JAVA SUGAR PLANTERS.

BILLS FOR THEIR RELIEF.

A despatch, dated the 18th December last, has been received from Mr. H. P. Fenton, Her Majesty's Secretary of Legation at the Hague, respecting the two Bills recently brought forward in the Second Chamber of the States-General of the Netherlands, having for their object the relief of the depression under which the sugar-producing interest in Java has for some time past been suffering. The purport of the two Bills was as follows:—

“(1.) That no payment should be required from those planters of sugar-cane and sugar manufacturers who have contracts with the Dutch Indian Government under the provisions of the Law of 21st July, 1870, in respect of one-half of the total amount of the tax which will become payable by them in 1887 and subsequent years, on the produce of their plantations until 1892; but that in that year, and in each of the succeeding four years, they shall pay one-fifth of the whole amount of which payment had been so deferred.

“To this provision an amendment, or rider, was proposed by two members of the Chamber, to the effect that the produce of the sugar-cane fields of those planters who have no contract with the Government, the so-called “free planters” shall on the same terms as those above stated, be exempt from the tax in question until otherwise provided by law. This amendment was approved by a vote of 45 to 34, and the Bill, thus amended, was then passed by 49 votes to 30.

“(2.) The second measure proposed by the Government provided that, during a period of two years, dating from the 1st of June next, the export duty on sugar from Java, as established by the Law of 16th April, 1886, should cease to be levied, to which, however, an amendment was submitted, extending from two years to five years the period during which the suspension of the duty should take effect, and this amendment was likewise passed by 46 votes to 31. Thereupon the Bill, thus amended, was approved by a vote of 50 to 26.

“It need scarcely be added that the two Bills above described have still to be submitted to the First Chamber of the States-General. Should they finally become law, they will, no doubt, afford considerable relief to the Java sugar producers, but they will, at the same time,

involve a very sensible loss to the Dutch Indian exchequer so long as they remain in force, for in the estimates of ways and means in the Indian budget for next year, the total amount to be derived from the tax on the sugar plantations is stated at 2,196,000fl., and the export duty on sugar from Java yields, at its present rate, about 600,000fl. annually."

In a further despatch, dated the 24th December last, Mr. Fenton says that the two Bills were approved on the 23rd December, after a short debate, by the First Chamber by majorities of 29 to 7 and 34 to 2 respectively; and dating from the 1st June, 1887, the duty on the export of sugar as established by the Law of April 16th, 1886, will cease to be levied.

SUGAR TRADE OF CANADA.

The following particulars respecting the sugar trade of Canada for the years 1883-4-5, are extracted from "The Home and Foreign Trade of Canada, and the Annual Report of the Commerce of "Montreal" for the year 1886:—

The quantity of sugar entered for home consumption in the Dominion of Canada during the year ended June 30th, 1883, was 152,729,569lbs., of a value of \$5,091,530; during 1884, 173,742,477lbs., of a value of \$5,509,429; and during 1885, 200,011,541lbs., the value being \$5,100,478. The duty on the sugar imported in 1885, was \$2,544,920, or nearly half its value. The principal countries from which the sugar is imported are the West Indies and British Guiana, Brazil, China, and Germany (beet sugar). Of the provinces of Canada, Quebec and Nova Scotia consume the largest quantity, taking 124,593,044lbs. and 43,065,265lbs. respectively.

The following comments are added by the editor of the pamphlet:—

"The national policy appears to have affected the sugar trade more than any other branch of industry or commerce. It may be remarked that not only have the imports greatly increased (the quantity for 1885 being 83·59 per cent. over that for 1878), but that, whereas in 1878 there was but seven per cent. of the total quantity imported taken direct from countries of production, in 1885 95 per cent. was so taken. The 200,011,541lbs. imported in 1885, aggregates a less value than the 108,943,920lbs. imported in 1878. This is owing to the lower

price of sugar throughout the world, and to the circumstance that, instead of the refined article being imported, as in 1878, the refineries now import raw sugar almost entirely. To the same causes may be attributed the fact that, although the imports were so largely increased, the amount of duty collected in 1885, aggregates less than in 1878; the specific duty on each pound of sugar being about $2\frac{3}{4}$ cents per lb. in 1878, and about $1\frac{1}{2}$ cents in 1885."

PLYMOUTH SUGAR REFINERY.

SPEECH BY SIR EDWARD BATES, BART., M.P., ON THE SUGAR REFINING TRADE.

On the 11th ult. Sir E. Bates addressed his constituents at Plymouth, and, in the course of his remarks, said :—

Take a case that touches me very closely in more ways than one, but in one way, my unfortunate men, far more than another. You all know that, some few years ago, I bought the sugar refinery here. I have had it fitted with all the latest improvements and newest appliances. It employed from forty to fifty men, who have most of them wives and children dependent upon them. It is supplied with raw materials bought for cash at the lowest figures. It cannot pay its way by 20s. per ton on every ton of raw sugar melted. It must, therefore, be closed, as, unless things alter, I cannot longer stand a loss of £10,000 per annum.

I have laid out in the place in all £27,000, and have actually lost besides £15,000. And why? Mainly because the Germans, French, and Russians can inundate this country with refined sugars, similar to those refined in your own town, on the export of which to this country they receive from 5s. to 8s. per cwt. from their Governments as a bounty, and which sugar they can, therefore, on arrival here, afford to sell under the cost of production in this country of a similar article. You get cheaper sugar by perhaps a halfpenny a pound, but what becomes of the workmen? They do not get wages to enable them to buy bread for their wives and children, let alone sugar. Gentlemen, I am not accustomed to be beaten in anything I undertake, but I confess myself beaten now. I doubt, therefore, if this

country can go on trading unless it raises a large portion of its revenue from the taxation of manufactured goods, imported from those countries who tax our manufactures sent to their country. Mind you, I say, tax only manufactured goods, not to tax raw materials they send us, such as wheat, cotton, raw sugar, &c., but to tax manufactured goods, and so lighten the amount to be raised from direct taxation from you and the people of England generally. This would be, according to my ideas, "Fair-trade" and Free-trade, and would be of service to the employers of labour, and enable them to give employment to the working man of this country. If something is not done, and that quickly, there will not be a sugar refinery at work in England before many years have gone by. Many are already closed in Scotland, England, and Ireland.

MR. DUNCAN'S WORKS ADVERTISED FOR SALE;

UPSET PRICE, £92,000—Cost £300,000.

Indeed, one of the largest refiners in London, Mr. James Duncan, I see by the *Times*, advertises his refinery for sale by public auction, which cost him £300,000, at the upset price of £92,000. This, at first sight, appears a very sad affair, but it is not as bad as mine. Mr. Duncan has been a refiner many years, in the good old times, and amassed a large fortune in the business, and if he got nothing for his refinery he must still be a heavy gainer. I commenced, as you know, in bad times, and made nothing, so what I have lost is money out of pocket, not having been a refiner in good times. This, however, does not trouble me half as much as my being obliged to close the concern, and thus throw out of employment a number of people in Plymouth. Through the proceedings of foreign Governments with their bounties you may be able to have your sugar cheaper for a short time, until the refinery business in the United Kingdom has become an industry of the past. But what then? Do you think these foreign Governments will continue to give their refiners the bounties they now do? No, no; having succeeded in closing all the refineries in the United Kingdom, bounties will cease, and their refiners can't then charge you any price they think proper. Where is your cheap sugar then? But what is more to the point, where are the hundreds of thousands of our working men that were employed in this industry, and, worse than all, where are their families? This is what troubles me.

COLONIAL BANK.

The half-yearly general meeting of the proprietors in the Colonial Bank was held on the 6th January, at the Offices, Bishopgate Street Within, Mr. H. H. Dobree in the chair.

The Secretary read the report, which stated that the total liabilities of the bank on the 30th of June last were £3,985,986, the principal items being the deposits at interest and on current account, £1,491,671; bills payable and other liabilities, £1,326,451; and notes in circulation, £406,910. The principal assets were—specie, £332,055; English and Colonial Government and other investments held in London, £726,736; bills receivable, &c., £1,406,252; and bills discounted in the colonies, bills in transit, and advances on security, £1,402,338.

The net profit for the half-year, after providing for all bad and doubtful debts and for income-tax, had been £31,765, which was increased by the amount brought forward to £33,452. They recommended a dividend for the half-year of 5 per cent., and the transfer of £2,500 to the reserve fund (increasing that fund to £130,000), leaving £952 to be carried forward.

The failure in Trinidad, alluded to at the last general meeting, had involved the bank in a heavier loss than was at first anticipated. The estimates of the crops about to be reaped were uniformly satisfactory from all the West Indian colonies, seasons having been unusually favourable to the growth of the sugar cane.

The Chairman, in moving the adoption of the report, observed that the accounts showed little variation from those laid before the meeting last July. They had £135,000 less cash in the West Indies, some specie having been brought home. The bills receivable had increased considerably, and they had now available assets to the amount of £2,538,000 to meet liabilities of £3,225,000, or nearly 80 per cent.—a fact which showed great financial strength, though not being altogether a matter of satisfaction, inasmuch as it showed that they were not able to employ their funds so closely as they could wish in the West Indies. The past year had been, if possible, as regarded the West Indies, worse than the preceding year, and it was a matter of surprise that there had not been greater disasters and more failures than had occurred.

The immediate prospects of the West Indies were, he thought, more favourable. Estates generally had much depreciated in value—indeed, in some districts they had been almost unsaleable—but the bank had no direct interest in estates. Recent advices showed some signs of improvement in trade, and therefore they might look for some improvement in the business of the bank. Remembering the two past bad years in the West Indies, he thought it matter of congratulation that they had been able to pay a dividend at the rate of 10 per cent. and to carry £2,000 to the reserve fund. Mr. George Fletcher seconded the motion. In answer to questions, the Chairman stated that the loss to the bank by the failure at Trinidad amounted to £30,000. He could see no advantage in presenting a profit and loss account, or in changing the form of accounts. They had gone on on the present lines for nearly 50 years under their charter, which was renewed a few years ago by Parliament. They had been legally advised that the liability of the shareholders was limited to the £70 per share uncalled. If they placed themselves under the Joint Stock Companies Acts he feared that they might run the risk of forfeiting their right to issue notes in the colonies. That was a matter for very important consideration. If, however, the shareholders thought that the charter should be revised or the bank turned into a limited company, the directors were ready to take the necessary steps. Respecting the matter of Thomas & Co., the amount had been finally written off. At the last meeting he expected that they would recover about £70,000 on that account, but that even if they lost all the suits they would get £20,000 in dividends. On the decision of the suit in the House of Lords they had received between £40,000 and £45,000, of which they had placed on the credit side of the account £20,000 previously standing to the debit, and about £25,000 therefore would figure in the next accounts. They also expected to recover a further large sum from the American law suits, but when those suits would be decided it was impossible for him to say. The motion was adopted, and a dividend of 5 per cent. for the half-year was afterwards declared.

THE PRICE OF SUGARS IN 1814.

The following particulars are taken from an old Trade Circular, dated London, 15th September, 1814:—

RAW SUGARS, West India—

Brown	100s.
Middling to Good Middling	105s.
Good to Fine	110s. to 120s.
East India	None.
Green Bastards	95s. to 98s.

GROUND SUGARS, Genuine—

Tips	about 104s.	} Very scarce.
Middles	108s. to 112s.	
Faces	115s.	

DRIED SUGARS—

Lumps Brown	156s. to 158s. ; good to fine, 162s. to 174s.	} Upwards.
Single Loaves	162s.	
Powder Loaves	170s.	
Double Loaves	210s.	

MOLASSES (to buy) 48s.

To prevent breakage would advise you to order the Casks to be Iron Bound, expense 2s. per Cask.

BROWN CANDY	1s. 6d. to 1s. 7d.
WHITE CANDY	2s. 6d.

THREE MONTHS' CREDITS.

Those of our friends who remit us in one or two months will be fully compensated either in quality or price.

The duty upon West India Sugar in 1814 was 30s. per cwt., and upon East India 31s. to 39s. per cwt. The revenue therefrom was £3,276,513. The consumption was about 100,000 tons in that year, including sugars used in distilleries. The price of muscovado in bond was 73s. 4d. per cwt.

The total imports this year amounted to 216,000 tons, of which 29,000 tons were foreign sugars. The exports of raw and refined were 115,000 tons.

The importations of East India sugars were very trifling—only 2,500 tons.

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FOR TWENTY YEARS, 1867-1886.

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Year.	ESTIMATED POPULATION. 31st Dec.	SUGAR. Raw and Refined.		MOLASSES.		TEA.		COFFEE.	
		Tons.	Lbs. per Head.	Tons.	Lbs. per Head.	Lbs.	Per Head.	Lbs.	Per Head.
1867	30,200,000	593,358	44·01	20,186	1·50	111,057,705	3·68	31,567,760	1·05
1868	30,450,000	561,135	41·03	37,379	2·75	106,918,118	3·51	30,608,464	1·01
1869	30,750,000	583,369	42·17	37,088	2·70	111,889,118	3·64	29,109,113	0·94
1870	31,100,000	666,368	48·00	35,790	2·50	117,622,575	3·78	30,629,710	0·99
1871	31,500,000	720,201	49·93	34,181	2·43	123,529,642	3·92	31,010,645	0·98
1872	31,750,000	715,400	50·47	31,045	2·19	127,792,412	4·02	31,661,311	1·00
1873	32,000,000	786,033	55·02	28,220	1·97	132,022,155	4·12	32,330,928	1·01
1874	32,200,000	853,845	59·40	13,705	0·96	137,422,563	4·27	31,860,080	0·99
1875	32,400,000	942,703	65·17	37,375	2·58	145,458,120	4·36	32,526,256	1·01
1876	32,700,000	852,438	58·39	21,540	1·47	149,132,185	4·56	33,342,288	1·02
1877	33,000,000	834,692	56·66	13,910	0·94	151,275,237	4·58	32,830,224	0·99
1878	33,200,000	903,597	60·97	30,943	2·09	157,691,762	4·75	33,393,248	1·00
1879	33,500,000	914,742	61·13	36,057	2·41	160,652,187	4·80	34,696,256	1·04
1880	34,000,000	946,094	62·33	8,617	0·57	158,570,334	4·66	32,569,824	0·96
1881	35,300,000	989,208	62·77	12,672	0·80	160,225,789	4·54	31,943,408	0·90
1882	35,700,000	992,893	62·30	8,679	0·54	165,079,881	4·62	31,962,560	0·89
1883	36,000,000	1,066,464	66·36	17,079	1·06	170,812,697	4·74	32,448,080	0·90
1884	36,300,000	1,071,155	66·09	17,163	1·06	175,097,983	4·82	33,016,256	0·91
1885	36,600,000	1,147,351	70·22	17,581	1·07	182,455,982	4·98	33,410,272	0·91
1886	37,000,000	1,100,861	66·65	18,253	1·15	178,894,151	4·83	32,391,184	0·88

NOTE.—For statistics prior to 1866, and from 1843, see the *Sugar Cane* for February, 1883, pages 94-103.

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Year.	COCOA.		RICE.		TOBACCO.		TALLOW.		WINE.	
	Lbs.	Per Head.	Tons.	Lbs. per Head.	Lbs.	Per Head.	Tons.	Lbs. per Head.	Gallons.	Per Head.
1867	4,585,517	0.15	78,868	5.85	41,053,612	1.36	52,076	5.86	13,754,343	0.45
1868	5,730,223	0.19	134,729	9.91	41,280,001	1.36	57,163	4.02	15,151,741	0.50
1869	6,564,216	0.21	175,038	12.75	41,719,500	1.36	59,056	4.30	14,840,158	0.48
1870	6,943,109	0.21	92,802	6.72	41,717,012	1.34	77,879	5.32	15,168,321	0.50
1871	7,333,988	0.23	103,649	7.37	42,775,334	1.36	67,630	4.81	16,237,756	0.52
1872	7,853,165	0.25	189,796	13.39	43,948,427	1.38	60,644	4.28	16,873,955	0.53
1873	8,311,023	0.26	162,042	11.37	45,944,485	1.44	73,976	5.18	18,027,104	0.57
1874	8,863,579	0.28	144,010	10.02	45,787,816	1.40	57,575	4.01	17,284,385	0.54
1875	9,973,926	0.31	168,687	11.66	47,026,912	1.45	45,052	3.11	17,349,370	0.54
1876	10,428,478	0.32	152,742	10.46	47,681,858	1.46	63,579	4.36	18,671,089	0.57
1877	10,060,637	0.30	192,355	13.06	49,300,088	1.49	56,300	3.32	17,671,273	0.54
1878	9,980,162	0.30	112,669	7.60	47,969,263	1.44	42,347	2.86	16,272,295	0.49
1879	10,111,526	0.30	181,167	12.11	47,309,809	1.41	49,100	3.28	14,945,093	0.45
1880	10,566,159	0.31	217,219	14.31	48,261,775	1.42	54,808	3.61	15,852,335	0.47
1881	10,897,795	0.31	253,563	16.09	48,481,049	1.38	42,896	2.72	15,644,757	0.44
1882	11,996,853	0.34	212,035	13.30	49,055,938	1.37	44,993	2.82	14,431,282	0.40
1883	12,868,170	0.36	198,537	12.35	49,565,605	1.38	39,921	2.48	14,382,983	0.39
1884	13,963,891	0.38	158,152	9.76	50,772,513	1.40	45,720	2.82	14,075,625	0.39
1885	14,595,168	0.40	121,457	7.43	51,325,060	1.40	42,085	2.58	13,848,748	0.38
1886	15,165,714	0.41	177,812	10.76	50,972,001	1.38	39,599	2.39	13,252,503	0.36

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Year.	BRITISH & FOREIGN SPIRITS.		FOREIGN WOOL.		COTTON.		RAW SILK	
	Gallons.	Per Head.	Lbs.	Per Head.	Lbs.	Per Head.	Lbs.	Per Head.
1867	29,090,697	0·96	142,951,240	4·73	911,910,496	30·17	3,947,634	0·13
1868	28,610,658	0·94	147,673,844	4·85	1,005,463,536	33·02	4,105,882	0·13
1869	29,624,124	0·96	141,853,383	4·61	948,298,512	30·81	2,524,215	0·08
1870	31,707,609	1·02	166,819,579	5·36	1,099,751,092	35·36	3,638,782	0·17
1871	34,454,883	1·09	184,412,542	5·73	1,406,281,520	44·64	4,961,500	0·16
1872	33,618,968	1·06	165,397,521	5·21	1,142,620,304	36·30	3,949,890	0·12
1873	37,779,940	1·19	189,824,608	6·12	1,318,087,232	41·19	2,718,322	0·09
1874	40,510,613	1·26	194,438,122	6·04	1,427,984,768	44·35	3,201,596	0·10
1875	42,427,400	1·31	189,059,859	5·84	1,233,200,864	38·06	1,939,019	0·06
1876	41,796,449	1·28	213,065,992	6·51	1,291,165,568	39·48	2,943,904	0·09
1877	40,420,555	1·22	218,546,900	6·62	1,188,365,920	36·01	2,784,453	0·08
1878	40,722,383	1·23	196,195,351	5·90	1,194,310,320	35·97	2,333,393	0·07
1879	38,475,646	1·15	167,793,165	5·01	1,287,063,568	38·42	2,517,273	0·08
1880	35,764,464	1·05	222,945,958	6·56	1,404,697,616	41·31	2,733,676	0·08
1881	37,094,323	1·05	181,684,961	5·15	1,466,423,616	41·54	1,986,628	0·06
1882	36,916,312	1·03	220,513,147	6·18	1,504,107,696	42·13	2,458,970	0·07
1883	36,765,068	1·02	216,929,406	6·03	1,474,421,088	40·96	2,660,000	0·07
1884	36,634,194	1·01	242,662,342	6·66	1,485,037,792	40·91	4,142,730	0·11
1885	35,956,465	0·99	233,514,124	6·39	1,203,496,224	32·88	1,698,719	0·04
1886	34,894,662	0·94	281,484,150	7·61	1,503,099,360	40·62	1,699,361	0·05

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Year.	TOTAL VALUE OF IMPORTATIONS.		TOTAL VALUE OF BRITISH AND IRISH PRODUCE EXPORTED.		RAILWAYS IN UNITED KINGDOM.		
	£	Per Head.	£	Per Head.	Capital Expended.	Per Head.	Nett Profit per cent.
1867	275,183,137	182/6	181,183,971	120/0	479,167,300	317/4	4.18
1868	294,460,214	194/0	179,463,644	118/0	486,893,400	319/10	4.13
1869	295,460,214	192/1	190,045,230	123/7	490,950,770	319/4	4.45
1870	303,257,493	195/0	199,586,822	128/1	504,381,000	324/4	4.49
1871	330,754,359	210/0	223,066,162	141/1	520,400,000	330/5	4.69
1872	353,375,740	222/7	255,961,609	161/3	537,285,640	338/5	4.83
1873	370,380, 42	230/3	255,073,336	159/5	569,047,346	355/8	4.75
1874	368,435,432	228/11	239,436,207	148/9	578,320,308	359/2	4.80
1875	373,941,125	230/10	223,494,570	138/0	590,223,494	361/0	4.72
1876	375,093,771	229/5	200,639,204	122/6	658,214,776	402/7	4.17
1877	393,941,256	238/9	198,731,073	120/4	674,059,048	408/7	4.13
1878	366,059,610	220/6	192,804,334	116/2	698,545,154	420/10	4.25
1879	362,127,741	216/2	191,503,672	114/4	717,000,000	428/10	4.15
1880	411,210,056	241/2	222,810,526	131/1	728,317,000	432/4	4.38
1881	395,656,350	224/2	233,938,919	132/7	745,528,162	422/5	4.29
1882	412,001,683	230/10	241,477,156	135/3	767,899,570	430/2	4.32
1883	425,603,932	236/7	239,829,744	133/3	784,921,312	436/1	4.80
1884	389,774,549	214/9	232,927,575	128/4	801,464,367	441/7	4.68
1885	373,834,314	204/4	213,021,407	116/5	815,858,055	446/-	4.04
1886	349,381,087	188/10	212,363,995	114/9	820,000,000	443/3	..

Estimated.

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Year.	DECLARED VALUE OF GOLD, SILVER, AND SPECIE.				BANK INTER EST. Annual Average percent.	INCOME TAX.	
	Imported.	Per Head.	Exported.	Per Head.		Nett Amount Assessed for Property and Profits.	Per Head.
	£		£				
1867	23,821,047	15/9	14,327,289	9/6	2.54	374,342,902	247/11
1868	24,852,595	16/4	20,220,014	13/3	2.10	386,542,366	253/11
1869	20,500,991	13/4	16,391,999	10/8	3.20	389,421,002	253/3
1870	29,455,668	18/11	18,334,450	12/2	3.04	398,222,811	256/1
1871	38,140,327	24/3	33,760,671	21/5	2.88	419,850,798	266/7
1872	29,505,319	18/7	30,335,861	19/1	4.10	434,802,952	271/9
1873	33,454,724	20/11	28,899,285	18/1	4.79	453,585,000	283/6
1874	30,380,268	18/10	22,853,593	14/2	3.70	481,002,000	298/9
1875	33,264,789	20/6	27,625,042	17/7	3.24	498,260,040	307/7
1876	37,057,353	22/8	29,464,082	18/0	2.61	503,676,578	308/7
1877	37,162,534	22/6	39,798,119	24/1	2.88	490,344,906	297/2
1878	32,421,490	19/6	26,686,546	16/1	3.77	493,598,158	297/4
1879	24,065,656	14/4	28,609,912	17/1	2.51	490,425,774	292/9
1880	16,287,964	9/7	18,889,503	11/1	2.76	486,077,028	285/11
1881	16,864,918	9/7	22,502,819	12/9	3.48	490,966,686	278/2
1882	23,620,579	13/3	20,389,258	11/9	4.16	504,158,462	282/5
1883	17,201,311	9/7	16,414,211	9/1	3.58	519,435,375	288/7
1884	20,321,853	11/2	21,999,222	12/1	2.95	531,129,500	292/7
1885	22,751,720	12/5	21,783,105	11/11	2.92	530,480,682	289/10
1886	20,863,895	11/3	20,957,405	11/4	3.04	540,000,000 Estimated.	291/11

SUGAR BOUNTIES IN PARLIAMENT.

The following notice of motion has been given by Mr. Kimber, M.P. for Wandsworth, for the 22nd of this month :—

SUGAR BOUNTIES.—“That, having regard to the terms of the existing commercial treaty with Belgium of 1862, whereby, in Art. iii. of the Protocol thereto annexed, provision was made for terminating simultaneously in the countries therein named all bounties on the export of sugar, and to the various diplomatic attempts since made by Her Majesty’s successive Administrations to procure the abolition of such export bounties, this House is of opinion that it is the duty of Her Majesty’s Government in the legitimate interests of such an important home and colonial industry as that of sugar production and manufacture to initiate such fiscal measures as shall, whilst securing the admission of all sugars from every part of the world duty-free when bounty-free, nevertheless subject all sugar exported with a bounty to a duty payable out of, and exhausting as far as may be, the bounty thereon, thus tending to deprive bounty-aided sugar of State protection so far as British markets are concerned.

“That negotiations for an International Convention for the complete abolition of all bounties on export should be resumed; and, in the meantime, pending the conclusion of the same, power be granted by Parliament enabling Her Majesty, by order in Council, to levy a duty on all foreign sugar receiving a bounty on export, and to revoke and annul such order as and when effect is given by foreign powers to the terms of such Convention.”

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; and
323, High Holborn, London, W.C.

ENGLISH.

APPLICATIONS.

16016. FRITZ SCHEIBLER, London. *Improvements in moulding sugar and in the apparatus employed therein.* (Complete specification.)
7th December, 1886.

16603. W. P. THOMPSON & Co., London and Liverpool. *Improvements in machine for cutting sugar canes and the like.* (Communicated by José de Rubio y Daza, Spain.) 17th December, 1886.

16615. J. KELLY, Blacfriars. *Improved method of making and preparing boiled sugar goods or sweets.* 17th December, 1886.

17041. R. CAMPBELL, Glasgow. *Improvements in and connected with triple effet evaporating steam vacuum pans used for boiling sugar, and for other evaporating purposes.* (Communicated by J. Foster and J. Campbell, Java.) 29th December, 1886.

602. R. A. ROBERTS and J. G. HUDSON, Glasgow. *Improvements in sugar cane mills.* 14th January, 1887.

16827. H. VIVIEN, London. *Improvements in apparatus for the manufacture of refined sugar, partly applicable to the manufacture of glucose, starch, and similar products.* 22nd December, 1886.

165. C. D. ABEL, London. *Method of extracting foreign substances, in particular raffinose, from sugar solutions by means of lead, either in the form of oxide or as electrade.* (Communicated by Messrs. Pfeifer & Langen, Germany.) 5th January, 1887.

ABRIDGMENTS.

1820. L. CUISINIER, Brussels. *A new or improved diastasic saccharine substance and method of manufacturing the same.* 8th February, 1886. Rice or maize is steeped in cold water for two or three days, after which the steeping water, which is usually very slightly acid, is drawn off and preserved for future use. The steeped grain is crushed between several successive pairs of steel cylinders. The meal thus obtained is immediately mixed with twice its weight of warm water at 67 degrees centigrade. There is also added from two and a half per cent. to five per cent. of green crushed malt per 100 kilos. of steeped and ground grain, and the whole is then heated by steam in a double bottom mixing pan, so as to maintain the temperature at about 67 degrees for two or three minutes. The charge is then cooled by pouring the steeping water into it, but the temperature must not be reduced below 60 degrees or 62 degrees. The charge is then placed by itself in a mash tub provided with an agitator, by means of which the charge is stirred from time to time. 3,000th part of chloride of methyl is added to prevent fermentation. When the liquor ceases to increase in density it is filtered and evaporated to syrup.

353404. C. H. W. FOSTER. *Method of filtering sugar liquors,*

syrops, and saccharine juices. November 30th, 1886. The inventor mixes with the sugar liquors and saccharine juices a granulated filtering medium, preferably coal dust, lignite, or clear sand, placing the said juices and granular filtering material in a basket of a centrifugal machine, and subjecting the same to centrifugal action to remove the thinner juices, which are to be saved, the slimy or gummy impurities contained in the said liquors or juices remaining in the granular filtering material.

354510. H. A. HUGHES, Rio Grande, New Jersey. *Process of stripping and cleaning sugar cane.* 14th December, 1886. This invention relates more particularly to the treatment of sorghum cane. The inventor has discovered that the dark colour and bitter taste of the diffusion juice obtained therefrom is due chiefly to the steeping of the leaves and sheaths, and that it can be avoided by stripping the cane. To effect this he divides the said cane into short lengths, assorting said lengths with reference to their diameters into two or more sizes, the said sizes being assorted successively, then subjects the pieces of each size to scratching or abrasion in devices respectively adapted to each size, and lastly simultaneously subjects the pieces of each size to brushing in devices respectively adapted to each size, whereby the surface of the cane is smoothed and polished.

353775. J. V. V. BOORAEM, Brooklyn, N.Y. *Apparatus for washing and separating sawdust and other material by centrifugal action.* 7th December, 1886. In order to be able to make repeated use of the fine sawdust, now used in sugar refineries as a filtering medium, the inventor has arranged a vat for water, in which is placed a rotary shaft provided with a stirrer, and an outlet for fine material near the top, and one at or near the centre for the discharge of the coarser material. Outlets for fine material are also provided at different points in the height of the vat at its circumference, and these outlets may be severally provided with valves, and communicate with a common outlet pipe.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

YEARLY RECEIPTS AT THE FOUR PORTS, NEW YORK, BOSTON, PHILADELPHIA, AND BALTIMORE (IN TONS), FOR TEN YEARS, 1877-1886.

FROM	Entire Year 1886.	Entire Year 1885.	Entire Year 1884.	Entire Year 1883.	Entire Year 1882.	Entire Year 1881.	Entire Year 1880.	Entire Year 1879.	Entire Year 1878.	Entire Year 1877.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Cuba	543288	505129	457085	425431	502410	421371	436891	499952	437417	384007
British W. I. Islands	63855	71229	64948	45738	23701	20290	20062	12759	13576	22494
Trinidad, P. S.	36031	38852	37866	30048	8538	3563	5127	2244	10219	24397
French W. I. Islands	7781	11301	30053	32780	28649	22997	23229	26827	31215	27463
Porto Rico	35665	57962	56430	46526	34693	23902	25816	29535	31917	1087
St. Croix	2226	1849	1279	902	1537	840	1147	1141	1577	28910
Demerara	40634	18678	19625	59614	34519	18613	18551	5878	6347	307
Central America ..	22	329	444	476	971	585	2493	114	504	12873
Belize	228	637	764	833	605	515	655	522	1385	5868
Surinam	1108	962	1403	1637	1944	1674	1556	956	323	35892
Mexico	278	167	98	373	430	842	669	956	601	7142
Hayti and San Domingo ..	15545	24048	16953	11759	12017	6818	10249	6686	4338	71117
Brazil	91244	126712	142348	91343	81029	107901	72389	21580	41435	17955
Peru	588	1497	943	1137	860	—	824	1539	2481	1087
Europe	149407	107945	85248	45889	7204	5941	2353	9208	1606	7120
Philippine Islands	140033	89206	96398	109081	75634	80940	74079	48941	642631	654442
Java	5709	8074	3254	576	5422	15707	15537	13316	11645	9986
China	4373	—	3865	7593	3827	5501	11353	—	—	—
Singapore .....	.....	—	221	595	364	—	109	—	54	—
Sundries	21661*	18351†	13640†	7759	9801	7365	9742	4488	—	—
Foreign	1159696	1082928	1032871	920090	834155	745371	732830	687367	642631	654442
Domestic	1391	6226	9380	4386	5296	7839	5854	21640	11645	9986
Total	1161087	1089154	1042251	924476	839451	758210	738684	709007	654276	664427

* Mauritius, 1,529 tons; Tuticorin, 10,679 tons; Sandwich Islands, 9,453 tons.

† Mauritius, 9,035 tons; Tuticorin, 9,316 tons.

‡ Mauritius, 7,350 tons; Tuticorin, 6,176 tons; Cape Town, 120 tons.

From Willett, Hamlin & Co.'s Circular, New York.

WEEKLY STATEMENT OF COMPARATIVE

For the last Fifty-two Weeks, compared

		German Beetroot 88 o/o Prompt, free on board.				French Crystals. No. 3, f.o.b.			West India. Good Brown.			Java afloat. No. 15 and 16.			
		1886.		1885.		1884.		1886.	1885.	1884.	1886.	1885.	1884.		
Jan.	1..	15/6	15/7½	10/1½	10/3	18/3	18/-	14/3	22/3	15/-	9/9	17/-	17/9	14/-	22/3
	8..	15/7½	15/9	10/3	17/9	17/10½	18/-	14/3	22/9	14/9	9/9	17/-	17/9	14/-	22/-
	15..	14/9	11/3	11/3	11/-	17/6	17/6	15/3	22/-	14/3	10/6	16/6	16/9	15/-	21/9
	22..	15/-	14/7½	11/6	11/3	17/4½	17/6	15/3	21/6	14/3	11/-	16/6	16/4½	15/-	21/6
	29..	14/-	11/10½	11/4½	17/-	17/1½	17/-	15/3	21/4½	14/-	11/-	16/-	16/3	15/-	21/-
Feb.	5..	13/9	14/-	11/-	11/6	17/9	16/9	15/3	21/9	14/-	11/-	16/-	16/-	14/3	21/3
	12..	13/7½	11/7½	11/9	17/3	17/6	16/9	15/-	21/9	14/-	11/-	16/-	15/9	14/9	21/6
	19..	12/6	12/9	11/9	11/10½	17/6	16/-	15/3	21/9	13/3	11/3	16/-	15/-	15/-	21/3
	26..	13/3	12/10½	12/1½	12/3	17/6	16/-	15/9	21/9	12/9	11/6	16/-	15/6	15/3	21/3
March	5..	13/1½	13/3	12/6	11/10½	17/3	15/9	15/9	21/9	13/-	11/6	16/-	15/6	15/3	21/3
	12..	13/-	12/10½	12/3	11/9	16/9	15/9	16/-	21/6	12/9	11/6	15/6	15/6	15/-	20/9
	19..	12/4½	11/10½	12/-	16/6	17/6	15/6	16/-	21/-	12/6	11/6	15/3	14/6	15/-	20/6
	26..	12/6	12/-	12/3	15/6	16/-	15/3	16/-	21/-	12/6	11/6	14/9	14/9	15/-	20/6
April	2..	12/3	12/6	12/1½	15/4½	15/6	15/3	15/9	20/6	12/6	11/6	14/6	15/-	15/3	20/-
	9..	12/7½	12/9	12/1½	15/9	15/9	15/9	15/9	20/-	12/9	11/9	14/6	15/-	15/3	19/6
	16..	13/-	13/1½	12/3	12/4½	15/6	15/9	15/9	19/6	12/9	11/9	14/6	15/6	15/3	19/6
	23..	13/6	12/9	12/7½	15/3	15/-	16/-	15/9	19/-	13/-	11/9	14/-	15/9	15/3	18/3
	30..	13/9	13/1½	13/-	12/10½	14/6	16/-	16/-	18/6	13/-	12/-	13/-	15/9	15/6	17/6
May	7..	13/3	13/-	14/-	13/10½	13/9	15/9	17/-	19/-	12/9	12/9	14/-	15/6	16/3	18/6
	14..	12/9	12/7½	14/6	14/9	15/6	15/6	18/-	19/3	12/6	13/3	14/-	15/-	16/9	18/9
	21..	12/-	16/-	16/3	15/6	15/3	15/3	19/-	19/6	12/-	15/-	14/-	14/3	18/6	19/3
	28..	11/9	17/-	16/9	15/-	14/9	14/9	19/6	19/3	11/9	15/9	13/6	14/-	19/-	19/-
June	4..	11/1½	15/10½	16/4½	14/6	14/3	14/3	19/-	18/9	11/6	15/6	13/3	13/6	18/9	18/6
	11..	10/6	16/-	16/4½	13/9	14/-	13/9	19/3	18/-	11/-	15/-	12/6	13/3	18/9	17/6
	18..	10/10½	17/-	16/9	14/3	14/-	14/-	19/6	18/-	11/-	15/6	12/9	13/4½	19/-	17/6
	25..	11/1½	10/10½	16/-	16/1½	13/9	14/3	19/3	17/9	11/3	15/3	12/3	13/6	18/6	17/3
July	2..	11/1½	15/4½	15/10½	13/6	13/9	14/6	19/-	17/9	11/3	14/9	12/-	13/6	18/3	17/3
	9..	11/3	11/4½	15/9	15/4½	14/-	14/3	18/6	18/3	11/3	14/-	12/3	13/7½	17/9	17/3
	16..	11/6	11/7½	15/-	14/7½	13/7½	14/6	18/-	17/6	11/3	13/3	12/3	13/7½	17/-	17/3
	23..	11/3	14/-	15/-	13/6	13/3	14/6	17/9	17/6	11/-	13/6	12/-	13/6	16/9	17/-
Aug.	30..	11/3	11/4½	15/-	15/1½	13/3	14/3	17/6	17/6	11/-	13/6	12/-	13/4½	16/9	17/-
	6..	11/-	10/10½	14/7½	14/10½	12/9	13/9	17/6	17/-	11/-	13/3	11/6	13/3	16/9	16/9
	13..	11/-	11/1½	14/9	14/10½	12/-	13/4½	17/6	16/6	11/-	13/6	10/9	13/-	17/-	16/3
	20..	11/3	11/1½	15/-	15/3	12/-	13/4½	17/9	16/6	11/-	13/9	11/-	12/9	17/6	16/-
Sept.	27..	11/1½	11/-	15/1½	15/6	12/9	13/4½	18/6	16/9	10/9	14/-	12/6	13/-	18/-	16/3
	3..	11/-	10/10½	15/7½	15/9	12/4½	13/4½	19/-	16/6	10/9	14/6	12/-	13/-	18/3	16/-
	10..	11/1½	11/3	16/1½	16/-	12/3	13/6	19/-	16/6	10/9	15/-	11/6	13/3	18/6	16/-
	17..	11/6	12/-	15/6	11/6	11/-	14/-	19/-	16/-	11/-	14/9	10/6	13/9	18/3	15/6
Oct.	24..	12/-	11/9	15/3	15/1½	11/-	14/-	18/6	15/6	11/-	14/3	10/-	14/3	17/9	15/-
	1..	11/9	11/1½	15/-	14/9	9/10½	13/9	18/-	14/9	11/-	14/-	9/9	14/3	17/9	14/6
	8..	11/-	10/10½	15/-	15/4½	10/9	13/3	18/6	14/6	10/9	14/3	10/6	13/9	18/-	14/6
	15..	10/9	15/6	14/7½	11/9	11/3	13/-	17/9	15/-	10/9	13/9	11/6	13/6	17/9	15/6
Nov.	22..	10/9	15/-	14/9	12/6	12/-	13/-	17/6	16/-	10/9	13/9	12/-	13/3	17/6	16/3
	29..	10/3	10/4½	14/3	14/4½	11/6	12/9	17/6	15/6	10/9	13/6	11/6	13/1½	17/6	16/-
	5..	10/1½	10/3	14/-	14/1½	11/-	12/9	17/6	15/3	10/6	13/6	11/-	13/1½	17/3	15/9
	12..	10/6	10/7½	14/6	14/7½	10/10½	13/-	17/6	15/-	10/6	13/9	11/-	13/3	17/-	15/6
Dec.	19..	10/10½	10/1½	15/-	15/1½	10/7½	13/6	17/9	14/6	10/9	14/-	10/6	13/6	17/6	15/-
	26..	10/9	14/9	15/-	10/4½	10/4½	13/4½	17/9	14/6	10/9	14/3	10/6	13/4½	17/6	15/-
	3..	10/9	10/10½	15/1½	10/3	10/3	13/3	19/6	14/6	10/9	14/6	10/3	13/3	17/9	14/6
	10..	11/6	11/1½	15/7½	15/6	10/-	13/4½	17/9	14/3	10/9	15/-	10/-	13/9	18/-	14/3
Dec.	17..	11/6	11/-	15/6	10/-	10/1½	13/6	17/9	14/3	10/9	15/-	9/9	13/7½	18/-	13/9
	24..	11/-	15/6	10/-	10/1½	13/6	17/9	14/3	10/9	15/-	9/9	13/6	17/9	13/9	13/9

PRICES OF RAW AND REFINED SUGAR

with those of the two previous years.

		Tate's Cubes.			Martineau's Titlers.			Say's Loaves, f.o.b.			Lebaudy Loaves, f.o.b.				
		1886.	1885.	1884.	1886.	1885.	1884.	1886.	1885.	1884.	1886.	1885.	1884.		
Jan.	1..	23/-	20/6	27/9	21/3	18/-	18/3	25/-	25/6	19/9	17/6	24/-	19/3	16/6	23/6
	8..	23/-	20/-	28/-	21/3	18/-	21/6	25/6	—	—	17/-	24/-	—	16/-	23/6
	15..	23/-	21/-	27/6	21/3	18/6	19/-	25/3	—	—	17/3	—	19/6	16/9	—
	22..	22/6	21/-	27/-	21/-	18/6	19/-	25/-	25/3	—	17/3	—	—	16/9	—
	29..	22/-	20/9	27/-	20/6	18/6	—	25/-	—	—	17/3	—	18/-	16/9	—
Feb.	5..	21/9	20/6	27/6	20/3	18/3	18/6	25/-	—	—	23/6	18/-	—	—	23/-
	12..	21/6	20/9	27/6	20/3	18/6	18/9	25/-	25/3	—	23/6	18/-	—	—	23/-
	19..	21/-	20/6	27/3	19/9	18/3	—	25/-	—	—	23/6	—	—	—	23/-
	26..	21/-	20/9	27/-	19/6	18/6	—	25/-	—	17/6	23/6	17/6	—	—	23/-
March	5..	21/-	20/9	26/6	19/3	18/9	—	25/-	—	17/6	—	—	—	17/3	—
	12..	21/-	20/-	26/6	19/3	18/3	18/6	24/6	25/-	17/6	—	—	—	—	—
	19..	20/9	20/-	26/6	19/-	18/3	—	24/6	—	—	—	17/-	—	—	—
	26..	20/9	20/-	26/6	19/-	18/-	18/3	24/-	—	17/3	—	17/-	—	—	—
April	2..	20/9	20/6	26/6	19/-	18/3	18/6	24/-	—	17/3	—	—	—	—	—
	9..	21/-	20/-	26/-	19/-	18/-	18/3	24/-	—	17/3	—	—	17/-	—	22/-
	16..	21/3	20/6	26/-	19/3	18/3	18/6	24/-	—	17/6	17/3	—	17/3	—	22/-
	23..	21/6	21/-	25/6	19/3	18/9	—	23/6	—	17/9	17/9	22/-	17/6	17/3	21/6
	30..	21/9	21/3	25/-	19/6	19/-	19/3	23/-	23/6	18/-	17/9	21/6	—	—	—
May	7..	21/6	21/9	25/9	19/6	20/-	—	23/6	24/-	—	18/9	22/-	—	—	21/6
	14..	21/-	22/6	26/3	19/3	21/-	—	23/9	24/-	—	19/-	22/-	17/6	—	21/6
	21..	20/6	23/3	26/-	19/-	21/9	22/-	23/9	24/-	—	20/6	22/-	17/3	—	21/6
	28..	20/6	24/6	25/6	18/9	22/6	—	23/6	23/9	17/3	21/-	21/9	—	21/-	—
June	4..	20/-	24/-	25/-	18/3	22/-	—	23/3	23/6	—	—	21/6	16/9	—	21/-
	11..	20/-	23/-	24/6	18/-	21/6	—	23/-	—	16/6	20/6	21/-	—	—	20/6
	18..	20/-	23/6	24/6	17/9	21/6	—	23/-	—	16/6	—	21/-	16/-	—	20/6
	25..	20/-	23/-	24/-	18/-	21/6	—	22/-	22/6	—	—	—	16/-	—	20/-
July	2..	20/3	23/-	24/-	18/-	21/3	—	21/9	22/-	—	—	20/6	16/-	—	20/-
	9..	20/3	22/6	24/-	18/3	21/3	—	22/-	—	16/6	20/-	20/3	16/-	—	20/-
	16..	20/3	21/6	24/-	18/3	21/-	—	22/6	—	—	19/6	20/3	16/-	—	20/-
	23..	20/3	21/9	24/-	18/3	20/6	21/-	22/6	—	—	—	20/3	16/3	—	19/9
	30..	20/-	22/-	23/9	18/3	20/6	—	22/3	22/6	—	19/6	2/3	16/-	—	19/9
Aug.	6..	20/-	22/-	23/9	18/3	20/6	—	22/-	22/6	—	—	—	16/-	—	19/9
	13..	20/-	22/3	23/6	18/3	20/6	—	22/-	—	—	—	—	16/-	—	19/6
	20..	20/-	22/6	23/-	18/3	20/9	—	21/6	—	—	20/-	20/-	13/-	—	19/3
	27..	20/-	23/-	23/6	18/3	21/-	—	21/6	21/9	—	—	19/9	15/9	—	19/3
Sept.	3..	20/-	23/3	23/-	18/3	21/3	—	21/6	—	—	19/9	15/6	—	—	19/3
	10..	20/-	23/6	22/9	18/3	21/6	—	21/-	—	16/6	22/3	19/9	15/6	—	19/-
	17..	20/3	23/-	22/-	18/3	21/6	—	20/6	—	—	22/3	—	16/-	—	18/6
	24..	20/3	22/6	21/6	18/3	21/3	—	19/6	20/-	—	21/6	19/-	16/-	—	18/6
Oct.	1..	20/-	22/-	21/-	18/3	21/-	—	19/-	—	—	20/9	18/6	15/6	—	—
	8..	20/-	22/-	21/3	18/3	21/-	—	18/6	19/-	—	20/9	18/-	15/6	20/6	17/6
	15..	20/-	22/-	21/6	18/-	21/-	—	19/-	19/6	—	20/9	18/6	15/6	—	—
	22..	20/-	22/-	22/-	18/-	20/9	—	19/6	20/-	—	20/6	19/-	15/3	—	—
	29..	20/-	22/-	21/6	17/9	20/9	—	19/6	20/-	—	20/-	19/-	15/-	—	—
Nov.	5..	20/-	22/-	21/-	17/6	20/6	—	18/9	19/-	15/3	19/6	18/6	14/9	—	—
	12..	19/6	22/-	21/-	17/6	20/6	—	19/-	—	15/-	19/6	18/6	14/9	—	—
	19..	19/6	22/-	20/6	17/3	20/6	—	18/9	—	15/-	19/6	—	14/9	—	—
	26..	19/6	22/6	20/6	17/3	20/9	—	19/-	—	—	19/6	18/-	14/9	—	17/6
Dec.	3..	19/6	22/6	20/6	17/3	21/-	—	19/-	—	—	19/6	18/-	14/9	—	17/6
	10..	19/6	23/-	20/6	17/3	21/3	—	18/9	—	15/6	20/-	18/-	15/-	19/3	17/6
	17..	19/6	23/-	20/6	17/3	21/3	—	18/6	—	15/6	20/-	—	15/-	—	—
	24..	19/6	23/-	20/-	17/3	21/-	21/3	18/-	18/3	15/6	19/9	—	—	—	16/6

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO DECEMBER 31ST, 1885 AND 1886.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1885.	1886.	1885.	1886.
	Cwts.	Cwts.	£	£
Germany	7,333,875	5,670,482	4,714,527	3,393,990
Holland	285,621	281,034	203,102	176,982
Belgium	544,720	757,727	385,718	450,703
France	26,229	47,361	21,636	27,824
British West Indies & Guiana	2,741,952	1,976,105	2,240,195	1,561,210
British East Indies	849,968	887,369	445,606	431,617
China and Hong Kong	14,679	48,257	5,644	28,005
Mauritius	252,110	291,759	183,708	181,215
Spanish West India Islands	652,659	21,409	499,820	15,459
Brazil	1,303,776	597,995	806,120	378,698
Java	3,695,256	3,909,462	2,845,958	2,853,467
Philippine Islands	486,890	555,757	263,872	276,606
Peru	609,610	472,311	440,846	335,755
Other Countries	585,401	633,978	407,297	428,907
Total of Raw Sugars ..	19,383,746	16,141,006	13,464,049	10,540,438
Molasses	392,879	431,387	139,010	137,980
Total Raw Sugars ....	.....	.....	13,603,059	10,678,418
REFINED SUGARS.				
Germany	977,097	1,830,142	841,992	1,494,759
Holland	1,277,092	1,185,027	1,173,518	1,010,602
Belgium	74,180	109,996	75,292	100,506
France	494,935	996,392	472,471	810,608
United States	2,298,605	1,424,030	2,087,142	1,230,562
Other Countries	216,141	821,440	194,149	672,412
Total of Refined	5,338,050	6,367,027	4,844,564	5,319,449

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	129,403	146,054	99,517	95,672
Belgium	77,694	51,361	56,763	35,507
France	78,404	42,931	61,116	31,439
Portugal, Azores, & Madeira	84,394	96,555	63,981	67,440
Italy	296,844	143,079	224,518	98,058
British North America	18,442	18,685	12,554	13,720
Other Countries	309,172	354,483	243,734	269,794
Total	994,353	853,148	762,183	611,630

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of December compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1883, 1884, and 1885, distinguishing the quantities of "Lumps and Leaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"LUMPS AND LOAVES."						"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			Dec.	Dec.	Dec.	Monthly Average..			Dec.	Dec.	Dec.	Monthly Average.			Dec.	Dec.	Dec.
	1883	1884	1885	1886	1885	1886	1883	1884	1885	1886	1886	1885	1884	1885	1886	1884	1885	1886
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
	3538	2737	2035	1462	1067	1787	2477	1621	546	2688	445	427	6015	2581	4150	2199	1494	5485
France.....	2352	3580	4247	3508	4137	2755	1853	1948	1555	1428	2104	2031	4205	5802	4936	6241	4786	4566
Holland	588	552	956	990	1055	1552	1854	2380	2859	6634	5853	9552	2442	3815	7624	6908	10552	11746
Germany & Austria ..	319	183	214	344	131	242	124	151	116	113	156	237	443	330	457	287	479	459
Belgium	226	962	722	854	176	659	294	3386	10654	5078	2306	6612	520	11376	5932	2542	7271	296
United States .....	..	..	..	..	..	..	..	..	..	3412	..	10504	..	..	3412	..	10504	..
Russia.....	..	..	..	..	..	..	61	121	12	9	15	..	..	12	9	15	11	..
Other Countries ....	..	..	..	..	..	..	6663	9607	15742	19362	10939	29363	13686	23916	26520	18192	35097	22552
Total	7023	8014	8174	7158	7253	6530	6663	9607	15742	19362	10939	29363	13686	23916	26520	18192	35097	22552

SUGAR STATISTICS—GREAT BRITAIN.

To JANUARY 22ND, 1887 AND 1886. IN THOUSANDS OF TONS, TO

	THE NEAREST THOUSAND.					
	STOCKS.		DELIVERIES.		IMPORTS.	
	1887.	1886.	1887.	1886.	1887.	1886.
London	74	96	15	15	13	19
Liverpool ..	80	105	14	15	17	21
Bristol	3	7	3	3	3	3
Clyde	40	76	9	10	13	20
Total ..	197	284	41	43	46	63
	Decrease.. 87		Decrease.. 2		Increase.. 17	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. FOR DECEMBER, 1886 AND 1885.

	STOCKS.		DELIVERIES.		IMPORTS.	
	January 1st.		In December.		In December.	
	1887.	1886.	1886.	1885.	1886.	1885.
New York	96	51	60	67	51	61
Boston	17	14	12	13	9	9
Philadelphia.....	2	3	11	7	10	7
Baltimore .....	..	..	..	..	..	..
Total.....	115	68	83	87	70	77
	Increase.. 47		Increase.. 4		Increase.. 7	

Total for the year — — 1116 1121 1161 1089

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, January 13th, 1887.

FAIR REFINING.	960/0 CENTS.	GRAN- ULATED.	STAND. A.	STOCK IN FOUR PORTS.
Jan. 13, 1887.—4½c.	5 3-16c.	5½c.	5½c.	Jan. 1, 1887—102,279 tons.
Jan. 14, 1886.—5½c.	6½c.	6 11-16c.	6 5-16c.	Jan. 1, 1886— 57,328 tons.
Jan. 15, 1885.—4¾c.	5¾c.	6¾c.	5¾c.	Jan. 1, 1885— 89,186 tons.
Jan. 17, 1884.—5 13-16c.	6 11-16c.	7 13-16c.	7 7-16c.	Jan. 1, 1884— 60,900 tons.
Jan. 18, 1883.—6¾c.	7 11-16c.	8 9-16-½c.	8½c.	Jan. 1, 1883— 50,297 tons.
Jan. 19, 1882.—7¼c.	8c.	9¾c.	8¾c.	Jan. 1, 1882— 43,927 tons.
Jan. 20, 1881.—7¾c.	8 5-16c.	9½c.	9c.	Jan. 1, 1881— 66,999 tons.
Jan. 15, 1880.—7¾c.	8¾c.	9 11-16-¾c.	9¾-½c.	Jan. 1, 1880— 63,558 tons.
Jan. 16, 1879.—6¾c.	7¾c.	8¾c.	8¾c.	Jan. 1, 1879— 50,773 tons.
Jan. 17, 1878.—7½c.	8 5-16c.	9¾c.	9¼c.	Jan. 1, 1878— 48,230 tons.
Jan. 18, 1877.—9½c.	10¾c.	11¾c.	11¾c.	Jan. 1, 1877— 25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST DECEMBER, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1886.	TOTAL 1885.	TOTAL 1884.
191	270	62	386	193	22	1124	1076	930

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST DECEMBER, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1886.	TOTAL 1885.	TOTAL 1884.
1166	439	43	380	185	335	2549	2609	2425

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE,
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP,
OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1886-87.	1885-86.	1884-85.	1883-84.
	Tons.	Tons.	Tons.	Tons.
France.....	500,000 ..	298,407 ..	308,410 ..	473,676
(German Empire	975,000 ..	825,081 ..	1,154,817 ..	986,402
Austro-Hungary....	525,000 ..	377,032 ..	557,766 ..	445,954
Russia and Poland ..	475,000 ..	537,860 ..	386,433 ..	307,696
Belgium	95,000 ..	43,421 ..	88,463 ..	106,586
Holland and other				
Countries.....	50,000 ..	37,500 ..	50,000 ..	40,000
Total.....	2,620,000	2,124,301	2,545,889	2,360,314

As compared with last month Mr. Licht's present estimate shows an increase of 40,000 tons, namely:—25,000 tons for Germany, and 15,000 tons for Belgium.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

There has been some slight increase of confidence during the past month, with prices occasionally in favour of the sellers, but the market is still quiet. Beet, 88 $\frac{7}{8}$ f.o.b., is 11s. 1 $\frac{1}{2}$ d., 11s. 3d. prompt, and for May delivery, 11s. 6d. Cane kinds have been steady all through the month.

The imports of American refined for December show a very marked falling off, being only 296 tons; making for the twelve months 71,200 tons, against 114,912 tons in 1885, and of 52,176 in 1884.

The imports in December of French refined were 5,485, against 1,494 tons in December, 1885.

On the 22nd January, 1887, the deliveries in the United Kingdom show a decrease of 1,753 tons as compared with 1886, and the imports a decrease of 16,438 tons as compared with 1886.

The stocks in the United Kingdom on 22nd January, 1887, were 197,116 tons, against 283,756 tons in 1886, a reduction of 86,640 tons.

Present quotations for the standard qualities, as under, are:—

FLOATING.		Last Month.
Porto Rico, fair to good Refining	11/- to 11/6 against	11/- to 11/6.
Cuba Centrifugals, 96% polarization	12/9 to 13/-	„ 13/- to 13/3.
Cuba Muscovados, fair to good Refining..	11/- to 11/6	„ 11/- to 11/6.
Java, No. 14 to 15, good to strong	13/6 to 14/-	„ 13/6 to 13/9.
LANDED.		Last Month.
Madras Cane Jaggery	8/- to 9/- against	8/3 to 8/9.
Manilla Cebu and Ilo Ilo	8/- to 8/6	„ 8/- to 8/6.
<hr/>		
Paris Loaves. f.o.b.	15/3 to 15/6	„ 15/- to 15/6.
Titlers	17/3	„ 17/3
Tate's Cubes.. .. .	19/3	„ 19/6
Austrian-German Beetroot, 88% f.o.b. ..	11/1 $\frac{1}{2}$ to 11/3	„ 11/- to 11/3.

THE SUGAR CANE.

No. 212.

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 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

It is rumoured that Sir William Robinson, at present Governor of Trinidad, is likely to have the much-coveted post at Hong Kong. The salary of the Governor of Trinidad is £4,000, and that of Hong Kong £6,000.

The Dessau Sugar Refining Company can again boast of a very favourable result. The net profit made in 1885-86, with a share capital of £120,000, was £54,745, of which £51,000 is applied to paying a dividend of 42½ per cent.

The Society of the extensive Lombardo-Liguerian Sugar Refineries, in Italy, has made a profit during the past year of 1,100,090 lire (£44,000), of which 600,000 lire (£24,000) are being applied to the payment of interest, and 500,000 lire (£20,000) to various sinking funds.

These results, the *Deutsche Zuckerindustrie* states, are all the more surprising, as it was notorious that the works had suffered a very considerable loss by the depreciation of the raw material, of which they held a large stock bought at a high price. The shares have consequently gone up very much, and a fusion of this company with the Raffineria Italiana at Rivalora, near Genoa, is spoken of as being likely to take place shortly.

In our last number, under the head "The Sugar Manufacture in Austria," we pointed out what appeared to us to be a discrepancy in the figures relating to the Rillieux process. M. Georges

Dureau, the *redacteur* of the *Journal des Fabricants de Sucre*, has obligingly furnished us with the exact figures, which are 81·42 kilos. of steam per 100 kilos. of beets, equal to 13·57% of coal, and not 18·41 kilos. and 13·77% (see page 72).

The New York *Tribune* states that during the discussion of the Hawaiian Treaty by the Senate in secret session, Senator Edmunds pointed out the necessity of securing a foothold in the Sandwich Islands in order to keep out England, Germany, or France. England, he declared, had lent the king of Hawaii large sums which would probably not be paid back. To secure herself, England might seize the islands, and were the British once in possession, the fate of the American planters would be sealed. Most of the democrats supported Mr. Edmunds.

In the House of Commons on the 15th ult., Baron H. de Worms, in answer to Mr. Kimber's question, as to whether any further correspondence had passed with continental Governments, with a view to an international conference on the subject of the sugar bounties; and whether there were any further papers which could be laid upon the table, said:—Certain Governments have been approached on this subject, and some have replied not unfavourably. The proceedings are not, however, at such a stage that any statement can be made at present, nor can any papers be laid on the table. In last month's *Sugar Cane*, page 102, we gave in extenso Mr. Kimber's notice of motion.

By the courtesy of Mr. C. K. Jardine, of the *Demerara Daily Chronicle*, we have received by the last mail a copy of "The British Guiana Directory, 1887." The publication of this useful Handbook has been suspended since 1883, but the property having recently been purchased by Mr. Jardine, it is intended to issue it annually. Whilst the information it contains is for the most part of purely local interest, there is much in it to interest outsiders. For instance, it gives a List of the Sugar Estates in that Colony, with the Names of the Proprietors, Managers, and the processes employed in the Manufacture of Sugar. This List we give in the present Number (see page 143).

We see by the *Demerara Chronicle* that Mr. William Russell has resigned his position as President of the Royal Agricultural and Commercial Society of Demerara, and has declined to be proposed

as an honorary member of the society. Mr. im Thurn has retired from the editorship of *Timehri*, the journal of this society.

At page 117 we give the actual results in money, of the experiments in 1885, in Barbadoes, on two estates, *Carrington's*, which produced V.P. sugar, and *Bentley's*, which made muscovado. According to this showing, the advantage of growing V.P. sugar is 30/- per acre, and this after deducting £5 per acre for interest and depreciation, too often overlooked in calculations of this kind.

We have pleasure in calling the attention, of our Colonial readers especially, to a paper by Mr. J. B. Harrison, of Barbadoes, on the "Selection and Application of Manures for the Sugar Cane." The analyses given have all been made by Mr. Harrison from samples, in almost all cases, drawn by himself. Some of the suggestions here made are, we understand, being carried out by some planters in this island. See page 129.

We give, at page 121, a condensed report of an important address recently delivered in Manchester by Mr. Samuel Smith, M.P., on "Bimetallism." Mr. Smith has spoken so much on this subject, that he may be said to have made it his own. We will not attempt to summarise it—it should be read through. Mr. Smith is decidedly of the opinion that to the appreciation of gold is largely due the great reduction in the values of commodities since 1873. The number of those who share this view is rapidly increasing, and must continue to increase.

Mr. Henry Tate has written to Members of Parliament a cogent letter on the Coal and Wine dues, expressing his surprise and disappointment at the resolution of the Conservative Metropolitan Members, to support the bill of the Metropolitan Board of Works for the renewal of these taxes. He says that in his refinery at Silvertown, where 40,000 tons of coal are used per year, he is handicapped nearly £2000 annually, because foreigners, and refiners in other parts of the United Kingdom are not subject to this charge.

While we are complaining of the bounties given to foreign manufacturers, our own manufacturer is heavily and specially taxed, and the proceeds go, as Mr. Tate points out, to practically irresponsible bodies.

The following is taken from *The Sugar Beet* (Philadelphia) for February:—

“How easy it is to theorize, but how very contradictory are frequently the cold facts resulting from experience! Duty on sugar from a *free-trade* standpoint means a sweet commodity selling at a high price; benefiting a few at the expense of the many. If the said duty should be taken off, the poor man, who averages 50lbs. sugar per annum, would be benefited, and the handful of Southern planters producing $\frac{1}{16}$ of the 3,000,000,000lbs. which enter yearly into consumption in the United States, would alone be the sufferers. *As matters now stand, sugar is sold on the American market as cheaply as in any other part of the world.* The Government is realising a large revenue from the duty on sugar; consequently, *private enterprise as well as all individuals are benefited by our existing protective policy.*” The italics are our own.

We, too, like “cold facts,” and should wish to bring one under *The Sugar Beet’s* notice; the lowest price at which American granulated has been sold in New York this year was on January 6th, when the price was $5\frac{1}{8}$ cents per lb., or 26s. 6d. per cwt. At that time the price in Liverpool, for the same sugars, was 16s. 6d., or a difference of 10s. per cwt.; and this is about the difference in the wholesale price of sugars between the two countries, all through.

The advocates of protection must be hard run, to have to have recourse to statements so wide of the mark.

In our last number, in commenting upon Messrs. T. Reid & Co.’s statistics for 1886, which gave the consumption of sugar per head at 66·65lbs., against 70·22lbs. per head in 1885, we ventured the opinion that there had not, in reality, been any falling off in consumption, but that the difference of $3\frac{1}{2}$ lbs. per head between 1886 and 1885, was made up by the reduced stocks in refiners’ and retailers’ hands—which were not brought into the account—and for the reason that such statistics were not obtainable. Messrs. T. Reid & Co. send us the particulars showing how the results they give are arrived at. We may observe that we did not doubt the accuracy of Messrs. Reid’s figures,—and our remarks were made to account for what, at first sight, seemed a remarkable state of things, viz., that with sugar at a lower level than ever before known, the consumption in 1886 had fallen off.

The vacant directorship of Public Gardens and Planation, Jamaica, has been filled up by the appointment of Mr. William Fawcett, late of the botanical department of the British Museum. As our readers are aware, this position was for many years occupied by Mr. D. Morris, M.A., F.L.S., now of Kew Gardens.

BARBADOS.

MUSCOVADO *versus* VACUUM PAN SUGAR.

In the *Sugar Cane* for November, 1885, page 577, we gave the results of experiments made on three estates, viz., Bentley's, Jordan's, and Bulkeley's. Experiments were made also on Carrington's estate, but owing to some of the data not being considered by the committee of the Agricultural Society to be absolutely reliable, they were not prepared to lay before the Council the results of the experiment as carried out between *Carrington's* and *Bentley's*, but they hoped at no distant date to be able to supply satisfactorily this information. This information Mr. J. B. Harrison has obligingly furnished us with. It will be seen that the advantage on the side of vacuum pan sugars over muscovado is £1 9s. 8d. per acre, after deducting for extra expenses, such as interest upon, and for depreciation of, the additional capital laid out upon improved machinery.

Comparative statement of the results obtained at Bentley's and Carrington's, April, 1885.

	Bentley's.		Carrington's.
Weight of canes sent to the mill	170,639	..	162,000
	Tons cwt. qr. lbs.		Tons cwt. qr. lbs.
Weight of canes per acre	30 9 1 19	..	28 18 2 8
Percentage of sugar in canes	16.51	..	16.00
Weight of sugar in canes	28,172lbs.	..	25,920lbs.
Percentage of fibre in canes	10.00	..	10.25
Imperial gallons of juice expressed ..	9,946	..	8,876
Density of juice at 80° Fahrenheit	1.081 = 11.1° B.	..	1.080 = 11° B.
Weight of juice obtained	107,516lbs.	..	95,860lbs.
Percentage of juice yielded by mill ..	63.08	..	59.17
Percentage of sucrose in juice	18.35	..	18.02
Weight of sucrose in juice	19,729lbs.	..	17,274lbs.
Weight of sugar obtained (muscovado).	15,021lbs.	..	....
" " " (crystals) ..	....	..	12,429lbs.
" " " (molasses) ..	....	..	2,240lbs.
Wine gallons of molasses obtained	546	..	280
Weight of molasses obtained	5,894lbs.	..	3,145lbs.
Weight of massecuite obtained	20,915lbs.	..	17,814lbs.
Percentage of sugar obtained in juice..	13.97	..	15.30
" " " canes.	8.80	..	9.05
" molasses " juice..	5.48	..	3.28

	Bentley's.		Carrington's.
Percentage of molasses obtained in canes.	3·45	..	1·94
„ massecuite „ juice..	19·45	..	18·58
„ „ „ canes.	12·25	..	10·99
Weight of sucrose obtained	16,779lbs.	..	14,739lbs.
Loss of sucrose in juice in manufacture	2,950lbs.	..	2,535lbs.
Percentage of sucrose in juice lost in manufacture	15·46	..	14·67
Loss of sugar in crushing	8,443lbs.	..	8,646lbs.
Total loss of sucrose	11,393lbs.	..	11,181lbs.
Percentage of loss to total sucrose	40·47	..	43·13
No. of days occupied in grinding canes	1½	..	1
Weight of coals used	none	..	3 tons
Mill and boiling-house expenses	£4 9s. 5d.	..	£6 0s. 0d.

Composition of the various Products obtained during the Experiment.

	MANUFACTURED AT BENTLEY'S.		
	Juice from Mill.	Muscovado Sugar.	Molasses.
Sucrose	18·35	90·20	54·81
Glucose	·52	2·27	11·33
Ash	·27	·32	1·49
Moisture	80·50	3·90	24·94
Organic Matter	·36	3·31	7·44
	100·00	100·00	100·00

	MANUFACTURED AT CARRINGTON'S.				
	Juice from Mill.	Crystals.	Massecuite for Molasses Sugar.	Molasses Sugar.	Residual Molasses.
Sucrose	18·02	96·00	59·40	79·30	34·12
Glucose	·61	1·51	15·95	7·64	21·14
Ash	·27	·21	3·51	1·45	3·48
Moisture	80·63	1·33	7·69	5·67	27·78
Organic Matter ..	·47	·95	13·45	5·94	13·48
	100·00	100·00	100·00	100·00	100·00

J. B. HARRISON,
Island Professor of Chemistry, &c.

Financial Results of the Experiments.

The Bentley's (muscovado) sugar weighed with hogsheads when sold in England, 7tons 1cwt. 1qr. 18lbs., on which a deduction equal to $10\frac{1}{2}\%$ was made for the weight of the packages, leaving a net weight of 6 tons 6cwt. 2qrs. 9lbs. of sugar, which was sold in two lots, 72cwt., at 14s. 9d. per cwt.; and 54cwt. 2qrs. 9lbs., at 15s. per cwt.; the proceeds being £94 0s. 9d. Upon this the charge for freight, commission, &c., was £17 7s. 9d., whilst a loss of £5 5s. was sustained by the cost of the packages. The net value of the sugar product was, therefore, £71 8s. To this must be added £13 13s., the amount for which the 546 gallons of molasses obtained was sold in the Island, and £4 9s. 5d. the mill and boiling-house expenses deducted. The net value of the products was, therefore, £80 11s. 7d., or £32 5s. 8d. per acre.

Of the sugar made at Carrington's, 50 bags of crystals weighed 5 tons 10cwt. 1qr. 8lbs., and sold at 20s. per cwt., whilst 9 bags of molasses sugar weighed 19cwt. 1qr. 2lbs., and sold at 14s. 6d. per cwt.; the proceeds amounted to £124 5s. 10d. Upon this the charge for freight, commission, &c., was £20 5s. 11d. The net value of the sugar produce was, therefore, £103 19s. 11d. To this must be added £4 13s. 4d., the amount realized by the sale of the residual molasses, and deducted £11 5s., the mill and boiling-house expenses, cost of bags, and extra fuel; leaving the net value of the products as £97 8s. 3d., or £38 19s. 4d. per acre.

Apparently, there is a sum of £6 13s. 8d. per acre in the value of the products in favour of the vacuum pan process, if we do not take into consideration the extra expenses represented by the interest upon, and the depreciation of, the additional capital required for improved machinery. In this case we may, perhaps, safely estimate this at, say 2s. per cwt. of sugar obtained, that is, in round numbers, at £5 4s. per acre. The net gain then was only £1 9s. 8d. per acre in favour of the vacuum pan process.

J. B. HARRISON,

Island Professor of Chemistry, &c.

Notes upon the Bentley's and Carrington's Experiments.

It is noticeable that the actual results of this experiment differ widely from those estimated at the time as resulting from the Jordan's and Bulkeley experiment. This is, to some extent, explained by the following considerations:—

1st.—The inferiority of the crushing at Carrington's. The mill gave about 4% less juice from the canes than the Bentley's mill; equal to an increase of 6.75% of juice obtained by the latter. If the mills had given equal results by the crushing we should have obtained about 7½ cwt. of crystals and 1 cwt. of molasses sugar, valued at £8, in addition to the actual yield; the gain would then have been £4 13s. 8d. per acre.

2nd.—At Bentley's, a Fletcher Brocklehurst filter press was used for the skimmings and mud. At Bulkeley the skimmings and mud were diluted, subsided, and the liquid obtained boiled with the molasses. At Carrington's, on the other hand, these were converted into rum, of the amount of which obtained it was impossible to get any account. As at least 5% of the sugar in the juice remains in the mud and skimmings; if neither filtered or used, as at Bulkeley, this accounts, in some measure, for the loss of 14.67% of the sucrose in the juice during manufacture as compared with 5.29% at Bulkeley.

3rd.—The difference in the actual loss of weight in the muscovado sugar with that estimated. It was estimated at 10%, but actually only amounted to 5.6%. Such a low loss of weight in the sugar shipped by sailing vessel, and not sold until about four months after manufacture (the sugar not being an oscillated but a common process one), reflects the very greatest credit upon Mr. J. J. Hutchinson, the manager of Bentley's, and those under his control. The loss upon the molasses sugar was 3.6%, and upon the crystals .58%.

J. B. HARRISON,

Island Professor of Chemistry, &c.

MOURILYAN SUGAR ESTATE, QUEENSLAND.—GREAT YIELDS.—We have had handed to us the following memorandum of the acreage of sugar canes cut up to the 19th of last month (November) on the Mourilyan Sugar Company's estates, Johnstone River district, together with the yield of sugar therefrom. The total area cut to date (19th November) was 399½ acres. This produced:—

				Tons.	cwt.	qr.	lb.
White Sugar—shipped .. ..	..	..	..	1017	0	1	6
Yellow and ration—shipped .. ..	..	..	..	214	3	1	22
In store, 7 coolers at 8 tons each .. ..	..	..	..	56	0	0	0
In store, 5 coolers at 3 tons each .. ..	..	..	..	15	0	0	0
In store, 2 coolers (4th sugars) .. ..	..	..	..	21	0	0	0
				1313	3	3	0

This shows an average of 65 cwt. 3qr. per acre, of which nearly 77.5 per cent. is white sugar.—*Queenslander*.

MR. SAMUEL SMITH, M.P., ON THE APPRECIATION OF GOLD.

On the 16th February, an address was delivered at the Athenæum, Manchester, on "The Sufferings caused by the appreciation of the Gold Standard" by Mr. Samuel Smith, M.P.; of which the following is a condensed report:—

There are many points of view from which the bimetallic question may be treated. When the mind is first turned to its importance, the question of a fixed ratio of exchange between gold-using and silver-using countries arrests attention most forcibly. The suffering and inconvenience caused by the absence of this par make the strongest impression. The injury to trade and the hindrances to the transfer of capital from gold-using to silver-using countries lie, so to speak, on the very surface of this question, and nowhere are they better understood than in Manchester, the heart of the cotton industry of England, whose trade is mainly with silver-using countries.

It was this aspect of the case which impressed me most strongly when I took up this subject ten years ago; but latterly I have come to the conclusion that there is another element of the case equally if not more important. I refer to the change of the value of the gold standard itself as affecting long-dated engagements and deferred payments. The custom of borrowing on a large scale began in the last century, and has been prodigiously developed in this one. The various national debts now exceed 5,000 millions sterling. The railway bonds, corporation debts, permanent or long-dated engagements of all kinds are simply incalculable.

We have had three well-marked movements of price within this century, all three in large measures due to changes in the standard of value. The century was ushered in by very high prices, partly caused by an inconvertible currency, depreciated for some years 20 to 30, partly caused by great scarcity and high prices for food, then there was an extraordinary and long-continued decline, extending say from 1810 to 1848 or 1849. This was brought about partly by the resumption of specie payments on the basis of the single gold standard, decided upon in 1816 and finally carried into effect in 1821; but probably in quite as great a degree by the action of other countries in resuming specie payments after the long Napoleonic wars came to an end. Concurrently with

this the production of the precious metals was very small—that of silver being virtually suspended for several years owing to the civil wars in South America. At that time gold and silver were linked together by the bimetallic system of France, so that the two metals rose and fell in purchasing power as one mass.

The extraordinary appreciation of the standard is shown by the fact that in 1845-50 £100 would purchase as many commodities as £224 did in 1809—that is to say, the purchasing power of the pound sterling had more than doubled, and prices on the average had fallen 55 per cent. I take these figures from Professor Foxwell, one of the ablest of our younger economists, and he adopts the index number of the *Economist** as his basis of calculation. Now it is beyond dispute that this was the dreariest time in the history of England. Never was suffering so widespread or so long continued. Large sections of the working classes were half-starved, and at times the country was on the verge of a social revolution. There cannot be a doubt that this distress was greatly aggravated by the prodigious fall of prices, or, what is the same thing, by the great appreciation of the gold standard; the huge national debt of 900 millions, contracted mainly in inconvertible currency, and representing according to Mr. Gladstone, from one-third to one-fourth of the whole capital of the nation, was virtually doubled; its annual interest of 28 millions went twice as far in the purchase of all the requirements of life as it did during most of the period when it was being contracted. An unintentional but most real fraud was perpetrated on the nation in favour of the fundholders—a very limited class in those days. The same aggravation of incidence applied to all other permanent or longstanding debts. The general effect was that the idle class, living on interest or annuities, was immensely and unjustly favoured at the expense of all the rest of the nation.

Referring to the time of large gold supplies from 1850 to 1873, which was by far the most prosperous epoch of English trade, when our exports sprang up by leaps and bounds, mounting from 63 millions in 1849 to 255 millions in 1873, Mr. Smith said: One may ask the question. Why did prices rise at all during this period except from the cheapening of money? We had during that period as much activity and competition in trade and manufactures as has ever been witnessed since. Scientific inventions and economising processes

* For some remarks showing the different "index numbers" or price levels, which have been adopted, and observations thereon, see *Sugar Cane* for 1886, page 313.

were never more numerous ; all these influences, which our opponents offer in explanation of the great fall in prices since 1873, were equally in force before that date. If they have caused, as we are told, the large fall of forty per cent. in prices since 1873, why did they not at least stop the rise between 1850 and 1873? It seems as conclusive to me as a mathematical proof that the great rise between 1850 and 1873, and the still greater fall since, have mainly arisen from changes in the standard of value itself. Most of the causes assigned for the great fall of prices since 1873 might have been equally applied to the previous period. Taking the index number of 100 to represent the low prices of 1845-50, the rise was to 142 in 1873; from this it fell with little interruption till it reached 92 in 1885; and when the average of last year is struck I doubt if it will be over 90, or the lowest point touched for 100 years, with the single exception of 1849, when for a short time that figure was also reached.

To bring out this truth more forcibly, let me remind you that our exports of British goods reached high-water mark in 1873, viz., 255 millions, from which they have declined, with occasional recoveries, till last year, when they only reached 212 millions. But the quantities increased so enormously that, adopting Mr. Giffen's table of computation, the total for last year would be over 350 millions, and possibly reach 360 millions sterling if valued at the rates ruling in 1873; in other words, the fall of prices may be put at 40 per cent. This prodigious fall has reproduced all the phenomena, though in a milder form, which characterised the first half of this century. All burdens fixed in money have grown much heavier. The idle and non-productive class have gained immensely at the expense of the industrious class. The fundholder, the mortgagee, and the money lender have drawn within their clutches a large part of the property of the active industrial class, and there has been a sense of almost hopeless oppression weighing on the community for many years, which happily is being somewhat lightened at the present time.

I wish to call special attention to this fact, that never in human history has there arisen such a pile of debts and obligations of all kinds as in the present century, with interest payable either perpetually or for long periods of time in a gold standard. I can point out a few of the main items, which are formidable enough. We have first a national debt of £750,000,000, with interest and sinking

fund amounting to £28,000,000 per annum. The railway bonds and preference shares amount to £500,000,000, with interest averaging say 4 per cent., or £20,000,000 a year. Local and municipal debts are estimated at about £160,000,000, say, at 4 per cent., £6,400,000 per annum. Then we have the vast amount of mortgages on land; they can only be guessed at, as we have no public registry of such debts; but I believe £500,000,000 is a moderate estimate of the mortgages on the soil of Great Britain and Ireland. Let us take interest at 4 per cent., and that will be £20,000,000. Then we have the corresponding mortgages on house property, on factories, on ships, and on industrial plant of all kinds. No estimate is any more than guesswork, but I shall be surprised if the amount does not exceed £500,000,000; this, with interest at 4 per cent., represents £20,000,000 per annum. We have further to take into account the long leases with fixed rates of payment. In such a country as ours the value of these is prodigious. Many of the largest incomes are drawn from ground rents. It is well known that large sections of the metropolis are built over on leases of 75 to 99 years' duration. The same applies more or less to all our great cities or centres of industry. This may be regarded as a tribute levied on the industry of the country by the landholding class. I am not aware that any accurate estimate exists of the amount, but I would venture to put it at thirty millions annually.

We have next to consider the royalties on mines, which have been felt as a heavy tax of late years, owing to the very low price of minerals. These I have seen estimated at about eight millions a year, but I do not give this as a reliable figure; indeed, all the figures I have given above are mainly suggestions for future inquiry, which would need to be conducted by a society of actuaries or professional statisticians. I do not think we possess any materials at present except for rough approximations. In addition to all these, there is a very large amount of fixed annuities, pensions, life interests, &c., chargeable on most estates or payable by the Government. It is well known that many of these estates have of late years hardly afforded any surplus to the nominal owners after paying interest on mortgages, annuities, and other fixed charges. I shall roughly assess the total of annuities, pensions, and other fixed charges not included in the other items I have dealt with at £18,000,000 a year; and this will make the total fixed charges, payable out of the industry of the country, about £150,000,000 a year. If we capitalise this all round at 27 years' purchase we find it repre-

sents a capital value of about £4,000,000,000, or fully two-fifths of the whole property of the country, which, according to the best statist, is now estimated at something over 9,000 millions sterling.

Now, anyone who reflects for a moment will see that this huge load grows heavier or lighter according to the scale by which the wealth of the country is valued. If the pound sterling represents a constantly diminishing value, as it did from 1850 to 1873, this prodigious charge becomes lighter and lighter; but if it represents an increasing weight, as it has done since the free coinage of silver was suspended in 1873, then it presses more and more heavily on the productive resources of the country. My own impression is that the present valuation of national wealth is too high, because our statisticians have not allowed sufficiently for the enormous fall in the selling value of land, and of the industrial plant of the country generally. I believe much of the assumed increase of the value of the national wealth is illusory, as there is not sufficient written off for depreciation. If the pruning hook were rigorously applied to all exaggerations, and the actual selling value of the nation's property be taken to-day, I doubt if it would be more than 8,000 millions, instead of above 9,000, as Mr. Giffen and others put it. In that case the pile of debts and permanent obligations would represent about one-half the national property.

The great fall of prices has transferred 10 per cent. of the wealth of the country to the money-lending and annuitant class; it has increased the claim which the idle and non-productive part of the community has upon the property of the remainder by the difference between 40 and 50 per cent. of the national wealth; it has to that large extent unjustly defrauded the toiling and hard-working masses of the nation, and has greatly added to the stream of social discontent, and so far weakened the institutions of the country and the guarantees for law and order.

In conclusion, Mr. Smith said: There are still some who boldly assert that there is no appreciation of the gold standard, and that the fall of prices is wholly due to other causes. I beg such persons to consider the following facts. The gold production, which for some years exceeded 30 millions annually, has fallen to 17 millions a year; and the best Continental authorities, such as Soetbeer and Laveleye, reckon that more than half that amount is consumed in the arts; it may, therefore, be reckoned that since 1873 only some 10

millions of gold on the average has been available for currency purposes. But Germany during that period has introduced a gold currency of 80 millions, the United States has resumed specie payments and has used up 100 millions, and Italy has drawn some 20 millions for a similar purpose; so that 200 millions have been withdrawn for these special purposes, whereas the whole supply of new gold for coinage has not exceeded in that time 130 millions. The balance must have been drawn out of existing stocks.

Further, a steady drain of some four millions a year has gone to India, further depleting the stocks in Europe. One result of this state of things is that hardly any new coinage of gold is now taking place. Most of the Mints of Europe are almost ceasing to coin new money; and while trade and population constantly grow and demand more metallic currency, there is a steadily diminishing quantity to meet it. If we put the present production of gold at 17 millions a year, and the requirements of the arts at eight millions a year, while the ordinary Indian demand is four millions, there is only left five millions a year for new coinage for all Europe, America, and the British colonies. It will seem to subsequent ages the height of folly that just at this period, when gold was running short, the chief States of the world decided to close their Mints against silver, and cut off, so to speak, one half the money supply of the world from performing its proper functions.

The silver supply for the last thirteen years has been about equal to the gold supply; by a providential arrangement, when the one metal fell off the other increased correspondingly; and had the world continued to use both metals as freely as before, the painful crisis we have passed through would have been much mitigated; but by a suicidal policy silver was cast off at the very time when it was most needed, and a double burden thrown upon gold just when it was only able to bear half its former burden. As Bismarck has well said, two men were struggling to lie under a blanket only big enough for one. The truth is, the total supply of the precious metals would have been small enough had silver been kept on its old footing. The very rapid increase of modern trade needs a constantly increasing supply of money to keep prices stable. We should, no doubt, have seen a fall even if the old bi-metallic system had continued; it is a notable fact that even silver-using countries like India have seen a fall of prices since 1873, but the fall has only been some 10 or 15 per cent., against 40 per cent. in gold-using countries.

I consider that it is immaterial whether we speak of the appreciation of gold or the depreciation of silver; what we mean is that the value of the one metal has risen relatively to the other. Had the old bi-metallic system of the Continent not been altered, the fall of prices in gold-using countries like England would have been lessened, and that in silver-using countries like India would have been increased; in fact, an equal fall would have taken place in all countries alike. Allowing that there are about equal values of the two metals in the world, in place of gold values falling 40 per cent. and silver values 10 per cent., there would have been an average fall of 25 per cent. all round; that is to say, we should have saved the last 15 per cent. of fall, which has cut into the quick, and carried multitudes over the line which separates solvency from insolvency. Now, how stands the matter with regard to the future? Will things rectify themselves as the orthodox economists of this country are in the habit of saying?

It is quite true that a revival of trade has set in, which may for a season give relief and withdraw attention from the malady. No one could be so foolish as to say that there never could be periods of good trade, even under the pressure of a contracted currency. The wonderful elasticity of the industrial machine will assert itself even against crushing burdens. Almost unbroken depression has reigned for ten or twelve years, and a temporary improvement is due, whatever mistakes may be made in monetary legislation; but I believe the improvement will not be long continued if we persist in our present suicidal policy. The silver question remains suspended over us, and the recent rise that has occurred can be ascribed to no permanent cause; probably it is due to a vague expectation that legislation in favour of remonetising silver will spring from the Royal Commission now sitting in London. Whether this be so or not, it is clear to me that if the Commission fails to do anything, and matters are allowed to slide, we shall soon be confronted with a great silver crisis. It is clear that the United States will not continue their present illogical position with regard to coining silver: they must either go back or forward, they must either cease to coin, or open their mints to coin silver as freely as they coin gold. They will gladly agree to the latter alternative if France and England join them, but they will certainly not do so alone; therefore they must adopt the other alternative of closing their mints against silver.

When this happens a further cataclysm in silver will occur. India will remain the only great market open to silver, and we shall be pressed by its Government to close its mints also, in order to keep the exchange from falling to a perfectly ruinous point. Unless we do so the Indian Government will become bankrupt, and if we do so silver will almost cease to have a value in the open market. All the misery caused by the first drop of silver, of say 25 per cent., will be repeated by a second drop equally great; and again, we shall see a heavy drop of gold prices and a further vast increase of all those permanent burdens which have been alluded to. I do not see how there is any logical escape from this conclusion; it follows even from the premises of our chief opponent, Mr. Giffen. He admits the great appreciation of gold; he holds that that appreciation must go on, and exhorts us to bear it meekly. It may be, however, that the suffering peoples may not bear it meekly; and that the constant increase of pressure may at last burst the boiler.

Now we of the bimetallic school urge that we possess a safety valve sufficient to relieve this terrible strain. We have an ample and an increasing supply of silver, just fitted to relieve the pressure on gold. The nations of the world, by a mixture of perversity and ignorance, have deprived themselves of this powerful ally; all now admit the unfortunate consequences of this mistake; all alike wish that the past could be undone; but the question is, "Who is to bell the cat? who is to take the lead in reconstructing the monetary system of Europe and America?" We know well that two of the greatest monetary Powers, France and the United States, are only waiting for an opportunity to rehabilitate silver, but they are absolutely determined not to act without us; and upon England depends whether this miserable state of things be put an end to or prolonged indefinitely. My object is to urge Manchester to bring its great and well-deserved authority to the true solution of this question. The time was when Manchester spoke with a voice to which all England listened. Cannot it now resume that position in regard to this vital question, and lead England, and with England the civilised world, to a solution of the most entangled and harassing difficulty which has blocked the path of progress in this century?

CERTAIN POINTS IN AGRICULTURAL CHEMISTRY, CON-
SIDERED IN REFERENCE TO THE SELECTION AND
APPLICATION OF MANURES FOR THE SUGAR
CANE IN THE ISLAND OF BARBADOS.

*Being a paper read before the Barbados General Agricultural Society,
November, 1886.*

By J. B. HARRISON.

The subject which we have met to discuss to-night is one of such great importance to us that no apology is needed for bringing it forward. We must not, however, think that by talking for an hour or so, that we shall do anything appreciable to elucidate it. That can only result from our united efforts, spread over some years. Nor must we think that our efforts, if successful, will result in any of those enormous (imaginary) returns of £25 per acre, and upwards, promised to us by certain of the more enthusiastic prophets of Tobacco, Fibre, Ground Nuts, and other minor industries. We must be satisfied if our united efforts, during the next seven years, produce a result equal to that advance which has been attained in this Island during the past seven, by the more scientific and economical system of purchasing manures by analysis, inaugurated and mainly supported by the Members of this Society. If we compare the average annual production of sugar in this Island, for the last three periods of seven years, we find, in round numbers, from 1866 to 1872, an annual crop of 47,700 hogsheads; from 1873 to 1879, one of 48,000; and from 1880 to 1886 (which period includes not only the first crop reaped after the introduction of our present system of manure control by our esteemed Consulting Chemist, Mr. George Hughes, and, I must also add, the establishment by our energetic fellow colonist, Mr. H. E. Thorne, of the Pioneer Chemical Manure Works of the British West Indies, but the short crop occasioned by the drought of last and the early part of this year), one of 55,300 hhds. Of this great increase much is, doubtless, due to the improvement in crushing, obtained in many instances by the substitution of steam for wind power, and the adoption of a more perfect system of manufacture in a few, a very few cases. A small portion may also be due to the cultivation of the sugar cane on soils formerly considered, and, I believe, in the majority of cases, rightly so, unsuited for such purpose (even this small increase is due to advance in our knowledge of the scientific selection and control of manures), but the greater portion, at least

55% of the total is, in my opinion, directly due to the Barbados General Agricultural Society's system of manure control. That is, in other words, taking the value of the hogshead of sugar and its molasses at £10, this Society, so frequently and unjustly jibed at as effete and useless, has, during the past seven years, increased the annual value of our produce by, in round numbers, £40,000.

Before entering into the discussion of our subject it will, perhaps, be as well for us to consider, in a general way, why manures are necessary for our crops. I have here the analyses* of a few of our Barbados soils, and I especially wish to draw your attention to the fact that whilst silica, alumina, iron peroxide, calcium oxide, and magnesium oxide are present in all cases, in large, or comparatively large proportions, in each case nitrogen, potash, and phosphoric anhydride are present only in small proportions.

Now when we burn any portion of a plant, we all of us know that a certain quantity of mineral matter which we term "ash" remains unconsumed. If this ash be examined chemically, it is found to contain very high percentages of two of these latter substances. For instance, in the ash of the sugar cane, on an average, we find from 21 to 22% of potash and from 6 to 8% of phosphoric anhydride; in that of the grain of Indian corn, 28% of potash, and 45% of phosphoric anhydride; and in that of the stem, 23% of potash, and 12.50% of phosphoric anhydride. The sugar cane also contains about .12% of nitrogen, a substance which it can only obtain from the nitrogenous constituents of the soil. We notice, therefore, that our crops remove large quantities of those constituents which our soils are poorest in.

Now as the sugar cane contains on an average .45% of mineral substances, or ash, and .12% of nitrogen, so that a crop of 30 tons of canes and tops per acre would remove in round numbers 300lbs. of the mineral substances and 81lbs. of nitrogen, we at once see that this means a considerable drain upon those of the soil constituents present in the smallest quantities, and that by taking crop after crop from the land the proportion of these substances must steadily diminish. I must here draw your attention to the fact that very minute amounts, as expressed in a soil analysis per cent., give very different figures as lbs. per acre. The weight of dry soil per acre to a depth of nine inches is approximately 3,000,000lbs., therefore .01% of any constituent means 300lbs. per acre. To this

* For these, see page 139.

fact I shall again refer when discussing the value which chemical analysis has when applied to a soil. As a Barbados soil, on an average, contains $\cdot 15\%$ of potash and of phosphoric anhydride, respectively, and about $\cdot 10\%$ of nitrogen, there will be 4,500lbs. of the two former, and 3,000lbs. of the latter constituent present per acre, or apparently sufficient potash for about 70, sufficient phosphoric anhydride for about 200, and sufficient nitrogen for 37 successive crops of sugar cane. But by far the greater portion of these substances exists in the soil in a condition in which they are not available as plant food; in fact, only a relatively minute portion of each appears to be in such available state, so that instead of having this very large supply of plant food for our crops, we can in any year count upon only a very small one, so small, indeed, that the growth of one crop not unfrequently diminishes it below the amount necessary for the perfect growth of a second. It is therefore necessary either to restore to the land these substances in some form, either at once assimilable, or capable of being rendered assimilable by decomposition, or other natural change, or else to take steps to cause a further portion of the constituents of the soil to become assimilable.

From the earliest times both these methods have been adopted, the first being known as manuring, the second as fallowing. Until after the expiration of the first quarter of this century the only substances used as manures were the refuse portions of the crops, and the excrement of the men and animals consuming them. It is evident that if all the excrement of men and animals could be returned to the land that a most complete manuring would ensue, but from the congregation of men into towns and cities, and from the increased facilities of intercourse throughout the world, causing the consumption of the produce of the land to frequently take place at a distance from where it has been grown, this has become an impossibility, and, indeed, even an approach to such a perfect manuring is daily becoming more difficult. The other method, or fallowing, consists in leaving the land for a length of time without a crop, so that the potash and phosphates in the soil are rendered more soluble by the action of the air and rain; whilst, however, this advantage is gained, the soil loses a large quantity of its nitrogen by drainage, this loss far exceeding the amount it gains by air and rain.

It (naked fallowing) is a most wasteful system of agriculture, and is rapidly being abandoned by those nations who believe that the use of

their brains in agriculture is as necessary to success, as it is in all other branches of industry. In no other industry than agriculture would a man even dream of allowing his capital not only to lie idle, but actually to diminish. From the increase of mankind, in many temperate climates, having caused such an increased demand for food products that the land cultivated on the naked fallow system could not meet it, a system, or rather systems of cultivation arose which are known as rotation of crops.

These systems are based upon the following principle: the separation of two crops of the graminaceæ by a leguminous and a root crop alternately, which principle is itself explained by the following scientific reasons:—That by thus alternating the crops the call upon the soil for mineral matter varies every year, the graminaceæ removing from the soil certain of its constituents which are not required in any great excess by the leguminosæ or the root crops, whilst these remove principally those constituents which are not required in excess by the former. Thus the call upon the soil for certain of the principal constituents of plant food is not successive, but alternate, so that during the growth of the leguminosæ and root crops, those constituents essentially required by the graminaceæ are being rendered assimilable by the air and rain and accumulated in the soil. Again, the leguminosæ and root crops are deep feeders, having long roots and thereby feeding largely from the subsoil, whilst the short-rooted graminaceæ feed mainly upon the surface soil.

It is also evident that by this system many of the advantages gained by naked fallow are obtained; whilst those fatal objections of loss of nitrogen by drainage, and of capital lying idle, are obviated. Our endeavours in these days of competition must be to turn over our capital as quickly and as frequently as possible, not to throw away any of these resources with which nature has so bountifully endowed us, and this we can only attain by calling science to our aid, by keeping our land covered with growing crops so selected that instead of injuring they may improve the succeeding cane crop, and by the use of chemical manures, scientifically selected and applied. With regard to the selection of crops for rotation and as "snatch crops," which latter are what we especially require here, I will, if no other better qualified person consent to do so, say a few words at some future evening meeting.

To assist us in the selection of manures for the sugar cane, we must consider their application in two lights; first as manuring the soil, second as manuring, or feeding, the plant.

The first, or manuring the soil, consists in the removal of any existing minimum of plant food by a sufficient supply of the deficient, or insufficient, constituents. The object of such manuring is to bring the soil into condition, that is, to place it in a state as regards its chemical composition in which it can bear good crops of any kind; in other words, to put the land in "good heart." Persons who have not made a study of agricultural chemistry are apt to think that a chemical analysis of the soil will give the information necessary for such manuring, and some manure makers, and, I regret to say, certain chemists, foster this delusion. A chemical analysis of a soil, no matter how complete and minute, in nine cases out of ten, cannot, in our present state of knowledge, give any reliable information as regards its manurial requirements. Of course if we find a soil with $\cdot 4\%$ of potash, $1\cdot 00\%$ of phosphoric anhydride or $\cdot 5\%$ of nitrogen (compare analysis No. 5), we know that it cannot be deficient in the total quantities of these constituents present; but even then we do not know if these constituents are present as what I may call "manurial plant food," or as "plant food in store." We cannot, at present, distinguish between those two groups by any chemical process. Again, all methods of chemical analysis are liable to error. We may say, for instance, in the case of a nitrogen determination in a soil, made with the greatest care, that this will amount to at least $\div \cdot 01\%$. Now, if we add to a soil 250lbs. per acre of sulphate of ammonia of 24% , equivalent to, in round numbers, 50lbs. of nitrogen, we know by experience that we shall get a great increase in the weight of our crop. Could the difference in the composition of the soil, before and after this manuring, be determined by chemical analysis? Most emphatically not; if the soil, for instance, has the composition of the soil marked No. 1 and contains $\cdot 143\%$ of nitrogen, equal to 4,290lbs. per acre, this addition of 50lbs. would raise the percentage to $\cdot 145$, that is the difference in composition which we know from experience in a favourable year would result in an increase of several tons of canes per acre, comes well within the limit of analytical error, thus probably amounting to from six to seven times the difference to be determined; and therefore, allowing that any apparent difference could be detected, the analyst could not tell

whether it was due to any change in composition, or to the error incidental to his work.

I will take another instance where we have the exact figures; let us compare the returns upon plots 10 and 11 in last year's experiments at Dodds. Plot 10, manured with phosphates and nitrogen, yielded 32,026lbs. of canes and tops per acre; plot 11, the same manuring, with the addition of, in round numbers, 35lbs. of potash per acre, gave 49,116lbs., an increase of 17,090lbs., or, in round numbers, of seven and a half tons per acre. The soil of that plot contains $\cdot 106\%$ of potash; after the application it would contain $\cdot 107\%$. This difference could not be detected by analysis, and yet it resulted in an increased yield of seven and a-half tons of canes. Again, the analysis of the Dodds soil has been seen by several of the best qualified chemists in the West Indies, who all agreed with me that the soil was especially deficient in phosphoric anhydride, and each of them would have recommended a manuring with phosphates; we manured it with these and got a smaller return than when we did not use them. Let us suppose that we could make absolutely correct determinations of the total proportions of the soil constituents, should we then be much nearer to an answer to questions as regard the manurial requirements of a soil? We should not; because we can only use as solvents acids, or water, whilst the plant can feed upon constituents which are insoluble in water, whilst acids dissolve, together with that portion of the plant food available for the plant, large quantities of that which, in its present form, is absolutely useless to it. Chemical analysis, as applied to soil, will only be of any great service when we attain nearly absolute accuracy and discover solvents which will act upon the soil constituents in exactly the same manner as the rootlets of plants.

After hearing what I have just said, you may ask why I have made exhaustive analyses of the soils of our experimental fields at Dodds? Certainly not with any view of finding out their manurial requirements, but in order that when other experimental fields are started elsewhere, by comparing the composition of our soil with that of the other places we may perhaps be assisted in finding out the stations whose results are comparable with ours, and perhaps also to explain discrepancies that may arise. If chemical analysis then cannot much assist us in ascertaining the manurial requirements of our soil, how can we ascertain them so as to supply them? Nature has provided

us with an inexhaustible supply of soil analysts, whose accuracy far surpasses that of any chemist, and who are willing to give us this information without either charging us an analyst's fee or any hope of thereby selling some manure. These able and considerate analysts are the plants themselves. In making a chemical analysis of a soil we use at the most for the determination of the larger number of its ingredients, 150 to 160 grains; for certain ingredients, such as the nitrates and chlorine, from 2 to 3lbs. A sugar cane planted 6ft. by 6ft. has at its disposal in the first 9 inches nearly 2,500lbs. of soil, is it therefore to be wondered at that the plant can avail itself of the various soil constituents and also be able to point out to us their relative deficiency, as a portion of substance, which, when we separate it from 150 grains cannot be weighed in our most delicate balances, may be present in very appreciable amount in 2,500lbs. of soil. If in a soil any one of the necessary constituents of plant food be either absent, or present in deficient quantity, a plant cannot attain, upon such a soil, its fullest development; and based upon this fact are the modern systems of agricultural research. Very many experiments are conducted in a manner similar to the Dodds' ones of last year; that is, by applying to the soil only the constituent the action of which we desire to investigate and then comparing the yield obtained, with that from a plot not so manured. This mode although valuable as a preliminary to an extended series of experiments, by indicating to some extent the line of investigation which should be followed, is not unfrequently faulty in its indications, or rather in our interpretation of them. Let us take as an example our Dodds' experiments, referring to the results obtained on plots 7, 9, 10, and 11. One manurial factor was constant on all of the plots, each received $2\frac{1}{2}$ cwt. (equal to $44\frac{1}{2}$ lbs. of nitrogen) of nitrate of soda per acre; plot 7 received nothing further; plot 9, in addition, $2\frac{1}{2}$ cwt. of superphosphate (equal to about 50lbs. of phosphoric anhydride) per acre; plot 10, in addition, 1 cwt. per acre of muriate of potash (containing only 35lbs. of potash); whilst plot 11 received the addition of both the superphosphate and potash. The results were, in the weights of canes and tops per acre yielded on No. 7, 34,242lbs.; No. 9, 32,286lbs.; No. 10, 35,904lbs.; and on No. 11, 49,116lbs. If we only considered Nos. 7, 9, and 10 we should be inclined to say that the soil contained a sufficiency of phosphoric anhydride for the needs of the cane, and that it required the addition of potash, but the very greatly increased

yield on plot 11 would show us the inaccuracy of such a conclusion, for on this plot either the addition of potash to the nitrogen and phosphates, or of phosphates to the nitrogen and potash, had caused a great increase on the weight of canes obtained. Which caused it? Is the soil deficient in available potash so that its addition is necessary to enable the phosphates to exert their manurial action? Is it deficient in available phosphates so that the potash cannot exert its full effect? Or, is it deficient in both? This experiment does not supply an answer to these questions; it is, therefore, a faulty one. It is, if taken by itself, a badly arranged one for their solution, and has left us in doubt and perplexity. Pointing out the errors and omissions in one's own work is an amusement that is apt to grow monotonous.

I will, therefore, take another example of an unsatisfactory method of agricultural research. In the *Official Gazette* of September 13th, will be found an extract from a report by Dr. Romanis, chemical examiner to the Government of British Burma, a most able chemist, on certain agricultural experiments which he had made upon the sugar cane. On an unmanured plot he obtained 26,759lbs.; on one manured with nitrate of potash and bone dust (a mixture supplying nitrogen in two forms, insoluble phosphates, and potash), 34,000lbs.; one with chloride of potassium and dissolved bones (that is a mixture containing less nitrogen than the preceding soluble and insoluble phosphates and potash), 24,610lbs.; on one with chloride of potassium alone, 40,248lbs.; on one with nitrate of potassium alone, 71,480lbs.; and upon one with nitrate of potassium and dissolved bones (containing nitrogen, soluble and insoluble phosphates, and potash), 50,862lbs. of canes per acre respectively. You will notice that there is not a common factor in these experiments—each is isolated from the remainder. We do not even know the amount of each constituent used, and the results obtained are somewhat inexplicable. Dr. Romanis attempts to explain them by reference to an excess of acid in the dissolved bones, and also hints that the discrepancies may be due to differences in the composition of the soil.

As far as the experiments go, like the Dodds' ones, they point to the importance of potash as an ingredient in cane manures, to the paramount influence of nitrogen in a ready available state upon the yield of canes per acre, as upon that of all the graminaceæ, and to the minor importance of phosphates. But, although I have spent some time in

considering them, I cannot obtain from them any further certain information. However, probably, if he has seen the report, Dr. Romanis has found the same fault with mine at Dodds. How then can we avoid these difficulties and get the plants to answer our questions in such a manner that we can understand them? We must bear in mind that much of the success obtained in an examination of any kind depends upon the skill with which the enquirer frames his questions. We must especially frame our questions with due deference to the need of the plant. Suppose one of our medical members wished to ascertain the effects of, let us say, alcohol, upon the human economy, would he do so by taking two men, feeding one of them with alcohol only, and not feeding the other at all? We all of us know that, if he did so, the results he would obtain, in the course of a few days, would be satisfactory neither to himself nor to the subjects of his experiments.

Yet we are only too prone to experiment in like manner upon plants. The plant, like the man, requires that each of its food constituents shall be available for it. If we wish to experiment upon one of the constituents of plant food, each of the others must be present in relative excess, in order that it shall be able to produce its maximum effect; and the effect solely due to the addition of an essential constituent can only be tested, not by withholding it altogether, as then the other food ingredients cannot properly act, but by adding it in regularly increasing proportions. Bearing these facts in mind, let us work out how we must apply a question to a soil as to whether it contains sufficient of an ingredient of plant food for the need of the sugar cane.

We must first select a plot of land upon the different portions of which the factors of light, exposure to wind and rainfall, depth, and nature of the soil shall be, as far as possible in our power, the same; the whole of it must also have undergone a precisely similar agricultural preparation and previous cropping. We will now ask the soil if it is deficient in nitrogen. We lay out four or five plots, say of from twenty to sixty plants each, we add to each plot the same amount of a manure containing potash and phosphates in considerable quantities, say at the rate of 25lbs. of potash and 80lbs. of phosphates per acre; the first receives, in addition, nitrogen at the rate of 20lbs.; the second, 30lbs.; the third, 40lbs.; and the fourth, 50lbs. per acre, equivalent to, in round numbers, about 100lbs., 150lbs., 200lbs., and 250lbs. of ammonia sulphate, or to 125lbs., 187lbs., 250lbs., and 312lbs. of nitrate of soda respectively. Now it is evident that the difference, if any, in the

yield of the plots must be due only to the nitrogen, and we shall obtain not only an answer to our question, but also to an equally important one, viz., what quantity of nitrogen will it pay us to apply to this soil under certain climatic conditions? By similar arrangements we ask the soil the same questions as regards its requirements for potash and phosphates, and obtain answers thereto. This is the only true and certain method of ascertaining the manurial requirements of a soil, and is one well within the powers of our managers. Let us hope that a time will soon arrive when each of our leading planters will make use of a power which he can so easily command, and which is so far beyond that of the most expert soil analyst. This method will assist also the followers of the minor industries in the attainment of their objects.

As far as I have gone, I have merely endeavoured to indicate the method which we must adopt to increase our agricultural resources; that is, our yield per acre, by the application of manures. I will next discuss what we must do in this way if we desire only to keep up permanently our present state of fertility. To keep the land in a state of permanent fertility it is necessary that there should be in it every year the same amount of available plant food. This is partially supplied by the nitrogen contained in the rain and dew, by the absorption of ammonia, and possibly in part by the direct assimilation of nitrogen by the soil, from the air; also by the gradual action of the air and rain upon the insoluble soil constituents, to enable which to take place, to the utmost, thorough tillage, and avoidance of loss of nitrogen by drainage, during naked fallow, are necessary; we partially supply it by returning to our land the refuse portions of our crops, and we must supply the balance by the use of artificial or chemical manures. To investigate what our crops unavoidably and permanently remove from our soil, we will consider the case of canes yielding 25 tons of stripped canes and five tons of tops per acre, and will assume that this is upon a properly conducted estate, where the tops are either fed out at once to the stock, or else "siloe." I must here remark that if a properly conducted system of ensilage were adopted throughout this island, it would do us, as sugar producers, a greater and especially a more permanent benefit than a reduction of say 20% in the German sugar bounties.

COMPOSITION OF CERTAIN BARBADOS SOILS (AIR-DRIED).

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
Moisture	8·900	10·849	12·463	8·796	15·876	8·327
Combined Water .....	....	9·662	9·869	....	....	....
α Organic Matter	10·985	1·721	1·874	5·721	16·100	10·199
Insoluble Silicates and } Sand	38·342	58·642	62·726	63·188	25·244	27·658
Soluble Silica .....	....	1·360	·482	1·264	·174	trace
Phosphoric Anhydride ..	·305	·079	·097	·149	1·187	·017
Sulphuric Anhydride ..	·196	trace	·005	·248	2·312	1·012
Carbonic Anhydride....	10·632	·319	·099	5·602	10·052	14·554
α Nitric Anhydride	·014	·007	·001	trace	none	none
Chlorine	·002	·022	·028	trace	·212	·401
Alumina	14·973	6·369	4·713	1·338	·325	1·099
Ferrous Oxide (Iron } protoxide).....	....	·278	·403	·226	11·481	5·549
Ferric Oxide (Iron } peroxide)	3·252	5·393	3·366	3·677	·765	1·035
Manganese Oxide	1·534	·771	·495	·337	trace	1·259
Calcium Oxide (Lime) ..	10·670	2·548	1·981	7·618	15·803	18·945
Magnesia	·372	·955	·784	1·239	·255	·653
Potash	·281	·106	·095	·306	·417	·121
Soda	trace	·716	·598	·740	·165	·305
	100·158	99·807	100·079	99·849	100·368	100·134
α Containing Nitrogen..	·143	·102	·154	·098	·537	·210
No. 1.—Very fertile sugar soil. No. 2.—Poor sugar soil. No. 3.— „ „ „ No. 4.—Good sugar soil.			No. 5.—Soil remarkably rich in “plant food in store,” but abso- lutely barren in its state as shown. No. 6.—Subsoil from bore-hole 63 feet deep.			

(To be continued.)

PACKARD'S FERTILIZERS FOR THE WEST INDIES.

The following circular has been issued by Messrs. E. Packard & Co., dated from their London Office, 155, Fenchurch Street, E.C., January 1st, 1887, to which we have pleasure in calling the attention of our readers in the West Indies:—

Sir,

We have much pleasure in directing your attention to the following facts in connection with our manufacture of specially-prepared fertilizers for the West Indies. The differences of climate, soils, period of growth and system of cultivation between those colonies and home, and, as regards many of these conditions, between one colony and another, materially affect the composition of the fertilizer best suited to meet the requirements of the planter, and to give an adequate return for the outlay of capital. Although manure manufacturers are well-informed upon the question of fertilizers for home crops, grown in a few months, they are often at a considerable disadvantage when preparing them for the very different conditions of tropical agriculture. With a view to placing ourselves in the best position to formulate really suitable fertilizers, we have secured the services of Mr. George Hughes, F.C.S., as our consulting chemist for the West Indies, knowing that he has had long practical experience upon these important points. We have also consulted Mr. J. McCarthy, F.C.S., chemist to the Government of Trinidad, especially in reference to our cocoa manure, and the formula those gentlemen have determined upon will be carefully adhered to by us. All manures will be sold under distinct guarantee, and all exports will be accompanied by Mr. Hughes's certificate of analysis of a sample authentically drawn at the time of shipment.

Under these conditions we trust we shall be favoured with your esteemed orders for the new year, and take this opportunity of expressing our hope that it may bring better times to those interested in the success of our West Indian colonies.

Yours faithfully,

ED. PACKARD & Co.

DIFFUSION EXPERIMENTS AT FORT SCOTT, U.S.A.

The following is taken from the minutes of the Louisiana Sugar Planters' Association, as reported in *The Sugar Bowl and Farm Journal*. It will be seen that the entire expenditure up to the end of 1886 amounted to nearly £10,000:—

U.S. Department of Agriculture, Commissioner's Office,
Washington, D.C., January 3rd, 1887.

J. Y. GILMORE, Esq., New Orleans, La.

Complying with your request, made at the instance of the Sugar Planters' Association of Louisiana, I beg to lay before you and them the following statement of the expenditures already made at Fort Scott of the amount appropriated last year for "experiments in the manufacture of sugar from sugar cane and sorghum by the processes of diffusion and saturation."

All of the bills connected with the sorghum experiments at Fort Scott have now been paid.

The entire expenditure has been \$48,837.98.

For the experiments with sugar cane at Fort Scott, the expenditure was \$4,265.92.

I have to call your attention further to the fact that all the costly problems preliminary to the experiments in Louisiana have already been solved.

In addition to this, a large part of the machinery for use in Louisiana is already on hand.

We have already belonging to the Louisiana outfit an engine, pump, pulleys, shafting, and belting, and a great deal of other apparatus. The value of the apparatus (this apparatus is chiefly at Fort Scott, some of it, however, is in Louisiana), which are to be used in Louisiana, is not less than \$8,000.

Our experience will enable us to avoid all the costly mistakes which have been made, and the planters of Louisiana can feel assured that plenty of money is left to make a thorough trial of diffusion and saturation in your State.

Very respectfully,

NORMAN J. COLMAN,
Commissioner of Agriculture.

Judge Emile Rost then handed the Secretary the following letter:—

ON THE LOCATION OF THE EXPERIMENT.

U.S. Department of Agriculture,
Washington, D.C.,
January 4th, 1887.

Judge EMILE ROST, Box 596, New Orleans, La.

Dear Sir,—Replying to your letter of December 24th, permit me to thank you for the willingness you express of allowing some arrangement to be made by means of which the experiments in diffusion may be conducted at your place.

There are so many details to be arranged in this matter that I think it best that I should visit, in person, your plantation, and have a conference with you in regard to the matter.

Invitations for proposals to build the machinery for this experiment were sent out last month, and I hope to have all machinery ready for shipment by the first of May.

As soon as my official duties will permit, I intend to make a visit to Louisiana, and hope to meet you and others interested in the matter for the purpose of making the final arrangements. I will give you timely notice of my arrival.

I am,

Very respectfully,

NORMAN J. COLMAN,
Commissioner.

Judge Rost said, in answer, he had written Colonel Colman that the sugar planters of Louisiana would be much gratified to have him visit this State, and had suggested that he fix the time for the next monthly meeting, on the second Thursday in February, and on this motion the following resolution was adopted:—

Resolved,—That the Hon. Norman J. Colman, Commissioner of Agriculture, be respectfully invited, if his official duties will permit, to visit this State, and be present at the next regular monthly meeting of the Sugar Planters' Association, on the 10th day of February, 1887, and that the Secretary be instructed to forward a copy of this resolution to him.

BRITISH GUIANA SUGAR ESTATES.

Last month, we gave (pages 84–89) a List of Sugar Estates in Jamaica, with the Names of the Owners, Attorneys, the Number of Acres under Cultivation, and the amount of Sugar and Rum produced in 1884; for which we were indebted to Messrs. Sinclair and Fyfes' valuable "Handbook of Jamaica," recently issued.

We are now able to give, through the courtesy of Mr. C. K. Jardine, of Georgetown, Demerara, who has just published a "Directory and Almanack of British Guiana, 1887," a List of Sugar Estates in that Colony. The particulars here given do not show the capacity of the different estates. A reference, however, to the *Sugar Cane* for 1883 (page 588), will, to some extent, supply this information.

The "Directory" is very well got up, and containing as it does, in addition to the Names of Residents, a large amount of condensed information, it cannot fail to be of value and interest to those having relations with British Guiana, a Colony which has shown of late years a degree of prosperity greater than that of any of our West India Possessions.

SUGAR ESTATES.

The letters "C.P." and "V.P.," which follow the Names of Estates, signify "Common Process" and "Vacuum Pan."

ADELPHI, V.P.—Canje Creek, Berbice; Proprietors, Quintin Hogg, Andrew Hunter and J. R. Hunter; Town Agents, S. Davson & Co.; Manager, D. Ritchie; Engineer, H. D. Scudamore.

ALBION, V.P.—Corentyne Coast, Berbice; Proprietors, Colonial Company, Limited; Attorneys, R. J. Kelly and T. H. Glennie; Town Agents, the Colonial Company; Manager, Howell Rickford; Engineer, David Johnstone.

ANNA CATHARINA—West Coast, Demerara; Proprietors, Sandbach, Tinne & Co.; Attorney, Hon. W. Russell; Town Agents, Sandbach, Parker & Co.; Manager, A. J. Sutherland. Canes manufactured at Leonora.

ANNANDALE, V.P.—East Coast, Demerara; Proprietor, Stewart Gardner; Attorney and Town Agent, Walter Bagot; Manager, George Bagot; Engineer, G. B. Steele.

ANNA REGINA, V.P.—North Coast, Essequibo; Proprietor, Sir Thomas Edwards-Moss, Bart.; Attorney and Manager, A. R.

Gilzean; Town Agents, Booker, Bros. & Co.; Engineer, M. I. Coster.

AURORA, V.P.—Arabian Coast, Essequibo; Proprietor and Attorney, Hon. William Craigen; Town Agent, William Smith; Deputy Manager, W. A. Craigen; Engineer, W. P. Abel.

BATH, V.P.—West Coast, Berbice; Proprietors, Andrew Hunter and T. M. Hunter; Attorney and Manager, T. M. Hunter; Town Agents, S. Davson & Co.; Engineer, Edward Bratt.

BEL AIR, V.P.—East Coast, Demerara; Proprietors, Bel Air Company, Limited; Attorney and Town Agent, A. Barr; Manager, B. R. Clark; Deputy Manager, W. B. St. Aubyn; Engineer, Llewellyn Jones.

BELLE VUE, V.P.—West Bank, Demerara River; Proprietors, Heirs of W. D. Elliott, deceased; Attorney, John Moore; Town Agents, S. Barber & Co.; Manager, John Pendleton; Engineer, Robert Dodds.

BLAIRMONT, V.P.—West Coast, Berbice; Proprietors, Davson Bros.; Attorney and Town Agent, John Downer; Manager, John Cumming; Engineer, H. D. Scudamore.

BLACKENBURG, C.P.—West Coast, Demerara; Proprietors, Heirs of Claude Neilson; Attorney and Town Agent, M. Garnett; Manager, Francis Bateman; Engineer, G. B. Steele.

BLENHEIM, V.P.—Leguan; Proprietors, Andrew Hunter, A. Barr, and Gibson Monro; Town Agent, A. Barr; Manager, Gibson Monro; Engineer, John R. Tilley.

CALEDONIA (New) V.P.—Wakenaam; Proprietors, Heirs of G. B. Johnston; Trustees, A. Barr and John R. Hunter; Town Agent, A. Barr; Manager, J. H. Ozanne; Engineer, J. R. Tilley; Deputy Manager, Charles Robertson.

CALEDONIA (Old)—Wakenaam; Proprietors, Heirs of G. B. Johnston; Trustee, A. Barr and J. R. Hunter; Town Agent, A. Barr; Manager, Charles Robertson.

CANEFIELD, V.P.—East Bank, Canje Creek, Berbice; Proprietors, The Ewing's Sugar Estates Company, Limited; Attorneys, B. H. Jones and P. H. Nind; Town Agents, Booker, Bros. & Co.; Manager, S. R. Cochran; Engineer, William Aitchison.

CANE GROVE, V.P.—West Bank, Mahaica Creek; Proprietor, J. McConnell; Attorney, B. H. Jones; Town Agents, Booker, Bros. & Co.; Manager, C. F. Bethune; Engineer, T. S. Cornish.

- CHATEAU MARGOT, V.P.—East Coast, Demerara; Proprietors, Heirs of Thomas Daniel, deceased; Attorney, A. J. Pitman; Town Agent, F. Grant; Manager, S. M. Bellairs; Engineer, Robert Dodds.
- CLONBROOK, V.P.—East Coast, Demerara; Proprietor, Attorney and Town Agent, R. P. Drysdale; Manager, R. B. Garratt; Engineer, T. S. Cornish.
- COFFEE GROVE, C.P.—Arabian Coast, Essequibo; Proprietor and Manager, Bassell Winter; Town Agents, Samuel Barber & Co.
- CORNELIA IDA, V.P. and Triple Effèt—West Coast, Demerara; Proprietors, The Cornelia Ida Estate Company; Attorneys, Hon. W. Craigen & W. Smith; Town Agent, W. Smith; Manager, Hon. W. Craigen; Deputy Manager, A. S. Ritchie; Engineer, G. Strachan.
- COVE AND JOHN, V.P.—East Coast, Demerara; Proprietor and Attorney, Hon. C. L. Bascom; Town Agent, William Smith; Manager, H. H. P. Holland (Fred. C. S. Bascom acting); Engineer, T. S. Cornish.
- CUMING'S LODGE, V.P.—East Coast, Demerara; Proprietors, Bel Air Sugar Estate Company, Limited; Attorney and Town Agent, A. Barr; Manager, B. R. Clarke; Deputy Manager, James Puddicombe. Sugar manufactured at Bel Air.
- DE KINDEREN, V.P.—West Coast, Demerara; Proprietors, Quintin Hogg, H. T. Stokes, and W. Matthews; Town Agent, A. Barr; Manager, H. T. Stokes; Deputy Manager, W. Matthews; Engineer, L. Jones.
- DE WILLEM, V.P.—West Coast, Demerara; Proprietors, John McConnell and Hon. Wm. Russell; Attorney, Hon. Wm. Russell; Town Agents, Booker Bros. & Co.; Manager, John Menzies; Engineer, W. S. Herriott.
- DIAMOND, V.P. and Triple Effèt—East Bank, Demerara River; Proprietors, Sandbach, Tinne & Co.; Attorney, Hon. Wm. Russell; Town Agents, Sandbach, Parker & Co.; Manager, J. M. Fleming; Engineer, Claude T. Berthon.
- DUNOON, C.P.—Demerara River; Proprietors and Town Agents, A. W. Perot & Co.; Manager, J. G. Thornhill.
- ELIZA & MARY, V.P.—Corentyne Coast, Berbice; Proprietor, Edmund T. Henery; Attorney and Town Agent, William Ingall; Manager, Alexander Logan; Engineer, M. N. White.

- ENMORE, V.P.—East Coast, Demerara; Proprietor, Henry Alymer Porter; Attorneys, Rashleigh Porter and J. J. Dare; Town Agents, Booker Bros. & Co.; Manager, Rashleigh Porter; Engineer, Henri Sedorff; Deputy Managers, Jos. Baynes and T. C. Philpots.
- ENTERPRISE, V.P.—East Coast, Demerara; Proprietors, Heirs of Jonathan and Benjamin Hopkinson; Attorneys, E. J. Borman and J. J. Dare; Town Agents, Booker Bros. & Co.; Manager, Edward J. Borman; Engineer, John Millions.
- ENTERPRISE, V.P.—Leguan; Proprietor, H. Mc.Niel Greene; Attorneys, Hugh Sprotson, jun., and D. C. Cameron; Town Agent, H. Sprotson, jun.; Manager, R. G. Brassington.
- EVERTON, V.P.—East Bank, Berbice; Proprietor, F. E. James; Attorney, E. T. Henery; Town Agent, W. Ingall; Manager, Geo. Welchman; Engineer, F. O. Barnes.
- FARM, V.P.—East Bank, Demerara River; Proprietors, Sandbach, Parker & Co.; Attorney, Hon. W. Russell; Town Agents, Sandbach, Parker & Co.; Manager, W. G. Nicholson; Engineer, C. T. Berthon.
- FOULIS, C.P.—West Coast, Berbice; Proprietor, Estate of David Denoon; Attorney, Mewburn Garnett; Manager and Lessee, Alexander Ross.
- FRIENDS, V.P.—East Bank, Berbice River; Proprietors, Colonial Company, Limited; Attorneys, R. J. Kelly and T. H. Glennie; Town Agents, Colonial Company; Manager, Hope W. Hunter; Engineer, David Johnstone.
- FRIENDSHIP, V.P.—Wakenaam; Proprietress, Mrs. Mary Cameron; Attorney and Town Agent, D. C. Cameron; Manager, Vernon Lambert; Engineer, J. B. Finney.
- GOEDVERWAGTING, V.P.—East Coast, Demerara; Proprietor, Wm. Stephenson; Attorney, A. Barr; Town Agent, A. Barr; Manager, William Morison; Engineer, Henri Sedorff.
- GOLDEN FLEECE, V.P.—Arabian Coast, Essequibo; Proprietors, Quintin Hogg, Andrew Hunter, John R. Hunter, and Hugh B. Hunter; Attorneys, A. Barr and H. B. Hunter; Manager, H. B. Hunter; Town Agent, A. Barr; Engineer, John R. Tilley.
- GOLDSTONE HALL, V.P.—East Bank, Canje Creek; Proprietors, Quintin Hogg, Andrew Hunter and J. R. Hunter; Town Agents, S. Davson & Co.; Manager, A. M. Gilchrist. Canes manufactured at Adelphi.

GOOD SUCCESS, C.P.—Wakenam, Essequibo; Proprietor & Manager, W. Ranken; Town Agent, W. Smith.

GREENFIELD, V.P.—Mahaica; Proprietors, John H. Booker and J. J. Dare; Planting Attorney and Manager, Malcolm Monro; Town Agents, Booker Bros. & Co.; Engineer, T. S. Cornish.

HAGUE, V.P.—West Coast, Demerara; Proprietor, Captain Percy Smith; Attorney, A. J. Pitman; Town Agent, F. Grant; Manager, F. Cunliffe Thorpe; Engineer, George Strachan.

HAMBURG, V.P.—Tiger Island, Essequibo; Proprietors, Heirs of G. P. Watson, deceased; Attorney and Manager, Henry R. W. Greig; Town Agents, George Little & Co.; Engineer, J. R. Tilley.

HAMPTON COURT, V.P.—Arabian Coast, Essequibo; Proprietors, Colonial Company, Limited; Attorneys, R. J. Kelly and T. H. Glennie; Town Agents, Colonial Company, Limited; Manager, R. G. Duncan; Engineer, R. C. Mollon.

HELENA, V.P.—Mahaica Creek; Proprietors, George Little, George Little, jun., and Edwin Morgan; Town Agents, George Little & Co.; Attorney and Manager, Edwin Morgan; Engineer, T. S. Cornish.

HENRIETTA, V.P.—Leguan; Proprietors, Wm. Smith and R. F. Rose; Attorney and Manager, R. F. Rose; Town Agent, W. Smith; Engineer, George Strachan.

HERSTELLING, V.P.—East Bank, Demerara; Proprietors, Herstelling Joint Stock Company; Attorney, Hon. William Craigen; Town Agent, William Smith; Manager, B. J. Greaves; Engineer, Geo. Strachan.

HET VERGENEGEN, V.P.—West Coast, Demerara; Proprietress, Mrs. Jane Craigen; Attorney, Hon. William Craigen; Town Agent, William Smith; Manager, John R. Daly; Engineer, Geo. Strachan.

HIGHBURY, V.P.—East Bank, River Berbice; Proprietor, Ludovico Porter; Attorney and Manager, Andrew Miller.

HOPE, V.P.—East Coast, Demerara; Proprietors, Heirs of J. Jones; Attorney and Manager, B. Howell Jones; Town Agent, F. Grant; Deputy Manager, W. Bovell Jones; Engineer, T. S. Cornish.

HOUSTON, V.P.—East Bank, Demerara River; Proprietors, Heirs of R. M. Jones and Heirs of H. H. Jones; Attorney, B. Howell Jones; Town Agent, F. Grant; Manager, J. Gillespie; Engineer, Robert Dodds.

INDUSTRY—East Coast, Demerara; Proprietors, Hogg, Curtis, Campbell & Co.; Attorney and Town Agent, A. Barr; Manager, B. R. Clarke; Deputy Manager, T. S. Sogden; Engineer, L. Jones. Canes manufactured at Bel Air.

JOHANNA CECILIA—South Coast, Essequibo; Proprietors, Messrs. Hunter and Hogg; Attorney and Town Agent, A. Barr; Manager, H. B. Hunter; Deputy Manager, N. W. King; Engineer, John R. Tilley. Canes manufactured at Golden Fleece.

LA BELLE ALLIANCE, V.P.—North Coast, Essequibo; Proprietor, Sir Thomas Edwards-Moss, Bart.; Attorney, A. R. Gilzean; Manager, H. L. Humphreys; Town Agents, Booker Bros. & Co.; Engineer, Maurice I. Coster.

LA BONNE INTENTION, V.P.—East Coast, Demerara; Proprietors, Hon. W. Russell and John Mc.Connell; Attorney, Hon. W. Russell; Town Agents, Booker Bros. & Co.; Managers, Henry Messervy (Cultivation), and Chas. H. Stuart (Factory); Engineer, T. S. Cornish.

LA BONNE MERE, V.P.—West Bank, Mahaica Creek; Proprietors, John Musterd and B. Howell Jones; Town Agents, Booker Bros. & Co.; Manager, John Musterd; Engineer, T. S. Cornish.

LA GRANGE, V.P.—West Bank, Demerara; Proprietor and Manager, R. B. Butts; Town Agent, A. Barr; Engineer, R. Dodds.

LA JEALOUSIE, V.P.—West Coast, Demerara; Proprietors and Town Agents, George Little & Co.; Manager, David Dougall; Engineer, G. B. Steele.

LA PENITENCE—East Bank, Demerara; Proprietors, Bel Air Company, Limited; Attorney and Town Agent, A. Barr; Manager, B. R. Clarke; Deputy Manager, W. J. Millions. Canes manufactured at Bel Air.

LEONORA, V.P.—West Coast, Demerara; Proprietor, W. R. Sandbach; Attorney, Hon. W. Russell; Town Agents, Sandbach, Parker & Co.; Manager, James Andrew; Engineer, W. S. Herriot.

LE RESSOUVENIR, V.P.—East Coast, Demerara; Proprietors, Ludovico Porter & Bros.; Attorney and Manager, G. M. Bethune; Engineer, T. S. Cornish.

LIMA, V.P.—Essequibo; Proprietress and Town Agent, Mrs. Mary Ann Roberts; Manager, John W. Westmaas; Engineer, James Vallance.

LOCHABER, C.P.—West Bank, Canje Creek, Berbice; Proprietors,

Ewing's Sugar Estates Company, Limited; Attorneys, Philip Henry Nind and B. H. Jones; Town Agents, Booker Bros. & Co.; Manager, Joseph Hunter; Engineer, William Aitcheson.

L'UNION, V.P.—Essequebo; Proprietors, L'Union Estate Company, Limited; Attorney, Hon. William Craigen; Town Agent, William Smith; Manager, J. M. Dawson; Engineer, W. P. Abel.

LUSIGNAN, V.P.—East Coast, Demerara; Proprietors, Quintin Hogg and W. A. Wolseley; Town Agent, A Barr; Manager, W. A. Wolseley; Engineer, H. Seedorff.

MARA, V.P.—East Bank, Berbice River; Proprietors, Colonial Company, Limited; Attorneys, R. J. Kelly and T. H. Glennie; Town Agents, Colonial Company, Limited; Manager, Herbert H. Barnard; Engineer, David Johnstone.

MA RETRAITE, C.P.—East Bank, Berbice River; Proprietors, Colonial Company, Limited; Attorneys, R. J. Kelly and T. H. Glennie; Town Agents, Colonial Company, Limited; Manager, H. Evans; Engineer, D. Johnstone.

MARIONVILLE (late Belle Plaine), including Domburg, V.P.—Wakenaam; Proprietor, John B. Martin; Attorney and Manager, S. I. Austin; Town Agents, Davson Bros. and Co.; Engineer, George B. Steele.

MARYVILLE AND WATERLOO, V.P.—Leguan; Proprietors, E. G. Barr, William Cameron, and others; Attorney, B. Howell Jones; Town Agents, Samuel Barber & Co.; Manager, Alexander Leslie; Deputy Manager, R. G. Stewart; Engineer, Robert Dodds.

MELVILLE, V.P.—West Bank, Mahaica Creek; Proprietor, Colin Smith; Attorney, Hon. William Russell; Town Agents, Booker Bros. & Co.; Manager, A. Struthers; Engineer, T. S. Cornish.

MET-EN-MEERZORG, V.P.—West Coast, Demerara; Proprietors, Executors of F. E. James, sen.; Attorney and Town Agent, F. E. James, jun.; Manager, George Sanford; Engineer, C. A. Matthey.

MON REPOS, C.P.—East Coast, Demerara; Proprietors, John Braud and Hon. Arthur Braud; Attorney and Manager, Hon. Arthur Braud; Deputy Manager, Thomas Woodman; Town Agents, H. Ledoux & Co.; Engineer, H. Seedorff.

MONTROSE—East Coast, Demerara; Proprietors, Ewing's Sugar Estates Company, Limited; Attorney, Philip H. Nind; Town Agents, Booker Bros. & Co.; Manager, John Orr Love; Engineer, William Aitchison. Canes manufactured at Vryheid's Lust factory.

- NISMES, C.P.**—West Bank, Demerara River; Proprietors, Thomas Sherwood, Carl Wieting, and G. H. Richter; Attorney, Carl Wieting; Town Agents, Wieting and Richter; Manager, J. B. Moore; Engineer, Robert Dodds.
- NONPAREIL, V.P.**—East Coast, Demerara; Proprietor, Quintin Hogg; Town Agent, A. Barr; Manager, Harry Garnett; Deputy Manager, J. L. Stoute; Engineer, L. Jones.
- OGLE, V.P.**—East Coast, Demerara; Proprietors, George Little, George Little, jun., and Peter Mc.Kinnon; Attorney and Manager, Peter Mc.Kinnon; Town Agents, George Little and Co.; Engineer, Robert Dodds.
- PERSEVERANCE AND CULLEN, V.P.**—Aroabisce Coast, Essequibo; Proprietors, Stewart Gardner and others; Attorney, George Bagot; Town Agent, Walter Bagot; Manager, John Wright; Engineer, M. I. Coster.
- PETER'S HALL, V.P.**—East Bank, Demerara River; Proprietors, Colonial Company, Limited; Attorneys, R. J. Kelly and T. H. Glennie; Town Agents, Colonial Company, Limited; Manager, Edward O. Luard; Engineer, R. C. Mollon.
- PHILADELPHIA, V.P.**—West Coast, Demerara; Proprietresses, Mrs. N. A. Finney and Mrs. L. A. Stephenson; Attorney and Town Agent, D. C. Cameron; Manager, D. A. Ainge; Engineer, James B. Finney.
- PORT MOURANT, V.P.**—Corentyne Coast, Berbice; Proprietor, John H. Kingston; Attorney, Hon. W. Russell; Town Agents, Booker Bros. & Co.; Manager, H. E. Murray; Engineer, W. C. E. Griffiths.
- PROVIDENCE, V.P.**—East Bank, Demerara; Proprietors, Sandbach, Tinne & Co.; Attorney, Hon. W. Russell; Town Agents, Sandbach, Parker & Co.; Manager, Jos. Monkhouse; Engineer, C. T. Berthon.
- PROVIDENCE, V.P.**—East Bank, Berbice River; Proprietors, E. T. Henery and Heirs of William Henery; Attorney and Town Agent, W. Ingall; Manager, H. E. Bullock; Engineer, M. N. White.
- RELIANCE, V.P.**—Arabian Coast; Proprietors, William Middleton Campbell and Henry Alexander Campbell; Attorneys, A. Barr and John R. Hunter; Town Agent, A. Barr; Manager, John R. Hunter; Engineer, John R. Tilley.
- RICHMOND HILL, C.P.**—Leguan; Proprietor and Town Agent, John A. Murdoch; Manager, J. A. Jackson.

- ROSE HALL, V.P.—Canje Creek ; Proprietors, Hon. Wm. Russell and J. Mc.Connell ; Attorney, Hon. Wm. Russell ; Town Agents, Booker Bros. & Co. ; Manager, W. Johnson Gill ; Engineer, W. C. E. Griffith.
- RUIMVELD, V.P.—East Bank, Demerara River ; Proprietor, C. J. Vander Ondermeulen ; Attorney, Hon. William Russell ; Town Agents, Sandbach, Parker & Co. ; Manager, Bryce Gemmel ; Engineer, Robert Dodds.
- SCHOON ORD, V.P.—West Bank, Demerara ; Proprietors, The Schoon Ord Sugar Plantation Company, Limited ; Attorney, J. Moore ; Town Agents, Samuel Barber & Co. ; Manager, W. R. Spence ; Chemist and Building Superintendent, A. Forrester ; Engineer, Robert Dodds.
- SKELDON, V.P.—Corentyne River, Berbice ; Proprietors, Henry Coke and R. R. Fowler ; Attorneys, J. J. Dare and Hon. Wm. Russell ; Town Agents, Booker Bros. & Co. ; Manager, Harcourt Forte ; Engineer, W. C. E. Griffith.
- SMYTHFIELD, V.P.—West Bank, Canje Creek ; Proprietors, Ernest Luxmore Marshall and Sir John Hanham ; Attorneys, W. Ingall and W. H. Quincey ; Town Agent, W. Ingall ; Manager, W. H. Quincey ; Engineer, M. N. White.
- SPARTA, V.P.—Essequebo ; Proprietress and Town Agent, Mrs. M. A. Roberts ; Manager, George F. Westmaas ; Engineer, Jas. Vallance.
- SPRING HALL, V.P.—Mahaica Creek, Demerara ; Proprietor and Attorney, J. B. W. Clementson ; Town Agent, Walter Bagot ; Manager, J. R. Reeburg ; Engineer, John Millions.
- STEWARTVILLE, V.P.—West Coast, Demerara ; Proprietor, Stewart Gardner ; Attorney, George Bagot ; Town Agent, Walter Bagot ; Manager, H. de Chalus ; Engineer, G. B. Steele.
- SUCCESS, V.P.—East Coast, Demerara ; Proprietors, Colonial Company, Limited ; Attorneys, R. J. Kelly and T. H. Glennie ; Town Agents, Colonial Company Limited ; Manager, P. B. Kearns ; Engineer, R. C. Mollon.
- SUCCESS, V.P.—Leguan ; Proprietors, H. Sproston and H. Sproston, jun. ; Attorney, D. C. Cameron ; Town Agents, Sproston Dock and Foundry Company ; Manager, James Williams ; Deputy Manager, F. A. Long ; Engineer, Robert Dodds.
- TAYMOUTH MANOR, V.P.—North Coast, Essequebo ; Proprietors, Thomas Daniel & Co., London, and Thomas Daniel & Sons,

Bristol; Attorney, A. J. Pitman; Town Agent, Ferris Grant; Manager, Charles Morrison; Engineer, W. P. Abel.

TURKEYEN—East Coast, Demerara; Proprietors, The Bel Air Company, Limited; Attorney, A. Barr; Planting Attorney, B. R. Clarke; Town Agent, A. Barr; Acting Manager, Joseph Sergeant; Canes manufactured at Bel Air.

TUSCHEN DE VRIENDEN, V.P.—West Coast, Demerara; Proprietors, Hon. W. Russell and John Mc.Connell; Attorney, Hon. W. Russell; Town Agents, Booker Bros. & Co.; Manager, John Turner; Engineer, W. Scott Herriott.

UITVLUGT, V.P.—West Coast, Demerara; Proprietors, J. Mc.Connell and Hon. Wm. Russell; Attorney, Hon. Wm. Russell; Town Agents, Booker Bros. & Co.; Manager, John Minty; Engineer, W. Scott Herriott.

VERSAILLES, V.P.—West Bank, Demerara; Proprietors, Henry Daniel and others; Attorney, A. J. Pitman; Town Agent, F. Grant; Manager, Chas. Ross; Deputy Manager, B. A. Robinson; Engineer, R. Dodds.

VIVE-LA-FORCE V.P.—West Bank, Demerara River; Proprietors, Hon. Thomas Mulligan and F. A. Mason; Attorney, Hon. Thomas Mulligan; Town Agent, F. A. Mason; Manager, E. B. Walcott; Engineer, G. B. Steele.

VREED-EN-HOOP—West Bank, Demerara River; Proprietors, The Colonial Company, Limited. Canes manufactured at Windsor Forest.

VRIESLAND, V.P.—West Bank, Demerara River; Proprietors, Heirs of Barry and Alexander Garnett; Attorneys, Mewburn Garnett and Hon. Thomas Mulligan; Town Agent, M. Garnett; Manager, Hon. Thomas Mulligan; Engineer, George B. Steele.

VRYHEID'S LUST AND BETTER HOPE V.P.—East Coast, Demerara; Proprietors, Ewing's Sugar Estates Company, Limited; Attorney, P. H. Nind; Town Agents, Booker Bros. & Co.; Field Manager, James Smith; Factory Manager, J. N. Shaffer; Engineer, W. Aitchison.

WALES, V.P.—West Bank, Demerara River; Proprietor, Attorney, and Manager, Joseph Briggs Mayers; Town Agents, Sandbach, Parker & Co.; Engineer, Robert Dodds.

WINDSOR FOREST, V.P.—West Coast, Demerara; Proprietors, Colonial Company, Limited; Attorneys, R. J. Kelly and T. H.

Glennie; Town Agents, Colonial Company; Field Manager, G. S. Munro; Factory Manager, F. J. Morris; Engineer, R. C. Mollon. ZEELUGT, V.P.—West Coast, Demerara; Proprietors, J. Mc.Connell and Hon. W. Russell; Attorney, Hon. W. Russell; Town Agents, Booker Bros. & Co.; Manager, John Russell; Engineer, W. Scott Herriott.

PROPRIETORS OF SUGAR ESTATES.

Barr, E. G., part proprietor of Maryville, Leguan.
 Barr, A., part proprietor of Blenheim, Leguan.
 Barry, heirs of, Vriesland.
 Bascom, Hon. Charles L. Cove and John.
 Bel Air Company, Limited, Bel Air, La Penitence, Industry, Cuming's Lodge, and Turkeyen.
 Black, H. M. A., heirs of, part proprietors of Maryville and Waterloo.
 Booker, John H., part proprietor of Greenfield.
 Butts, R. B., La Grange, West Bank, Demerara.
 Braud, John, and Hon. Arthur, Mon Repos.
 Cameron, Mrs. Mary, Friendship, Wakenaam.
 Cameron, W., part proprietor of Maryville and Waterloo.
 Campbell, William Middleton, and Henry Alexander, Reliance.
 Clementson, J. B. W., Spring Hall.
 Colonial Company, Limited, Success, E.C., Peter's Hall, Windsor Forest, Hampton Court, Albion, Friends, Mara, Ma Retraite, Vreed-en-Hoop.
 Coke, Henry, part proprietor of Skeldon.
 Cornelia Ida Estate Company, Cornelia Ida, West Coast, Demerara.
 Craigen, Hon. William, Aurora.
 Craigen, Mrs. J. E., Het Vergencegen.
 Daniel, T. & Sons and Daniel & Co., Taymouth Manor.
 Daniel, Thomas, the heirs of, Chateau Margot, Versailles.
 Dare, J. J., part proprietor of Greenfield, East Coast.
 Davson, Bros., Blairmont.
 Denoon, estate of David, Foulis.
 Drysdale, R. P., Clonbrook.
 Drysdale, John, heirs of, part proprietors of Perseverance and Cullen.
 Elliot, W. D., heirs of, Belle Vue.
 Ewing's Sugar Estate Company, Limited, Vryheid's Lust and Better Hope, Canefield, Lochaber, Montrose.

- Finney, Mrs. M. A., part proprietress of Philadelphia, West Coast, Demerara.
- Fowler, R. R., part proprietor of Skeldon.
- Gardner, Stewart, Annandale, Stewartville, part proprietor of Perseverance and Cullen.
- Garnett, Alexander, part proprietor of Vriesland.
- Greene, H. Mc.Niel, Enterprise, Leguan.
- Hanham, Sir John, part proprietor of Smythfield, Berbice.
- Henery, E. T., Eliza and Mary, part proprietor of Providence, Berbice.
- Henery, heirs of W., part proprietors of Providence, Berbice.
- Herstellig Joint Stock Company, Herstellig, East Bank, Demerara.
- Hogg, Quintin, part proprietor of Adelphi, Goldstone Hall, Lusignan, De Kinderen, Golden Fleece, proprietor of Johanna Cecilia, Non-pariel.
- Hogg, Curtis, Campbell & Co., part proprietors of Adelphi and Goldstone Hall.
- Hopkinson, B., heirs of, part proprietors of Enterprise, East Coast.
- Hopkinson, J. heirs of, part proprietors of Enterprise, East Coast.
- Hunter, Andrew, part proprietor of Adelphi, Goldstone Hall, Blenheim, Golden Fleece, proprietor of Bath.
- Hunter, John R., part proprietor of Adelphi, Goldstone Hall, Golden Fleece.
- Hunter, Hugh B., part proprietor of Golden Fleece.
- James, F. E., Everton, Berbice.
- James, executors of F. E. sen., Met-en-Meerzorg.
- Johnston, heirs of G. B., New and Old Caledonia.
- Jones, B. Howell, part proprietor of La Bonne Mere, Mahaica.
- Jones, J., heirs of, Hope, and part proprietors of Houston.
- Jones, H. H., heirs of, part proprietors of Houston.
- Kingston, John H., Port Mourant.
- Little, George & Co., La Jalousie, and part proprietors of Helena and Ogle.
- L'Union Estate Company, Limited, L'Union.
- Marshall, Ernest Luxmore, part proprietor of Smythfield, Berbice.
- Martin, John B., Marionville, Leguan.
- Mason, F. A., part proprietor of Vive-la-Force.
- Matthews, W., part proprietor of De Kinderen, West Coast.
- Mayers, Joseph Briggs, Wales.
- McConnell, John, proprietor of Cane Grove, part proprietor of De

- Willem, La Bonne Intention, Rose Hall, Tuschen de Vrienden,
Uitvulgt, Zeelugt.
- Mc.Kinnon, part proprietor of Ogle, East Coast.
- Monro, Gibson, part proprietor of Blenheim, Leguan.
- Morgan, Edwin, part proprietor of Helena.
- Moss, Sir Thomas-Edwards, Anna Regina and La Belle Alliance.
- Mulligan, Hon. T. M., part proprietor of Vive-la-Force.
- Murdoch, John A., Richmond Hill.
- Musterd, John, part proprietor of La Bonne Mere, Mahaica.
- Neilson, Claude, heirs of, Blankenburg.
- Ondermeulen, C. J. Vander, Ruimveld.
- Perot, W. H., part proprietor of Dunoon, Demerara River.
- Porter, Henry Aylmer, Enmore and Bachelor's Adventure.
- Porter, Ludovico, Highbury, part proprietor of Le Ressouvenir.
- Porter, M. L., part proprietor of Le Ressouvenir.
- Porter, W., part proprietor of Le Ressouvenir.
- Porter, R., part proprietor of Le Ressouvenir.
- Ranken, William, Good Success, Wakenaam.
- Roberts, Mrs. Mary Ann, Lima and Sparta.
- Rose, R. F., part proprietor of Henrietta, Leguan.
- Ross, Alexander, Lessee of Foulis.
- Russell, Hon. William, part proprietor of La Bonne Intention, Rose
Hall, Tuschen de Vrienden, De Willem, Uitvulgt, Zeelugt.
- Sandbach, Tinne & Co., Diamond Farm, Providence, Demerara.
- Sandbach, W. R., Leonora, Anna Catharina, West Coast, Demerara.
- Schoon Ord Sugar Plantation Company, Limited, Schoon Ord.
- Sherwood, Thomas, part proprietor of Nismes.
- Smith, Colin, Melville, Mahaica.
- Smith, Captain P., Hague, West Coast, Demerara.
- Smith, W., part proprietor of Henrietta, Leguan.
- Sproston, H., and H. Sproston, jun., Success, Leguan.
- Stephenson, William, Goedverwagting.
- Stephenson, Mrs. L. A., part proprietor of Philadelphia, West Coast.
- Stokes, H. T., part proprietor of De Kinderen, West Coast.
- Watson, heirs of G. P., Hamburg.
- Weber, Arthur, part proprietor of Dunoon, Demerara River.
- Wieting & Richter, part proprietors of Nismes.
- Winter, Bassell, Coffee Grove.
- Wolseley, W. A., part proprietor of Lusignan.

CUBAN CROP, 1886.

Ports.	Boxes.	Hogsheads.	Bags.
Havana	61,888	25,165	1,073,131
Matanzas.....	..	35,436	578,364
Cardenas	1,080	134,650	165,783
Sagua la Grande .....	..	86,397	172,873
Caibarien.....	..	20,748	211,242
Cienfuegos .....	..	47,056	348,910
Trinidad .....	..	7,765	6,516
Zaza .....	..	..	12,080
Manzanillo .....	..	239	36,302
St. Iago de Cuba .....	..	867	58,700
Guantanamo .....	..	4,258	153,436
Gibara .....	..	2,344	28,525
Nuevitas .....	..	..	45,015
Exported	<u>62,968</u>	<u>364,925</u>	<u>2,900,877</u>

Boxes at 410 lbs. net..... }
Hhds., 1,550 lbs. ,, } = 665,500 tons of 2,240 lbs., or
Bags ,, 310 lbs. ,, } = 745,360 ,, 2,000 lbs.
Local consumption 45,000 tons (estimated).

DESTINATION.

	Boxes.	Hogsheads.	Bags.
United States	11,057	354,717	2,387,707
Spain	36,642	11,968	275,687
Other Countries	14	900	36,503
Total	<u>50,713</u>	<u>367,585</u>	<u>2,699,897</u>
Stock at Warehouses	<u>14,000</u>	<u>1,000</u>	<u>160,000</u>
	<u>64,713</u>	<u>368,585</u>	<u>2,859,897</u>

The difference in the totals above and below, is accounted for by having taken the datas from different parties.

ON THE STOPPING OF COOLIE LABOUR IN QUEENSLAND.

From the *Brisbane Courier*.

The deputation of unemployed mechanics who waited on the Premier yesterday put before him a perfectly clear issue. Their three points were: relief works for mechanics only, total cessation of immigration, and protection. Of these the first was avowedly a temporary expedient. The deputation asserted, though not very strongly, that there was positive need for relief works to give mechanics out of employment the means of living. If such a necessity exists it must be met; men cannot be allowed to starve in this country. But the Colonial Secretary very properly told the deputation to give the Immigration Agent the information necessary for him to judge of the necessity for relief works. The request made that mechanics, if employed in relief works, might be kept together, and not distributed among pick and shovel and axemen in receipt of similar assistance, was a curious one, and supported by an assertion which, if made by anyone but handicraftsmen, would be fiercely denounced as a slander on the working class. It was said that unskilled labourers "ran" and "put it on" mechanics when both were employed together at the—to the latter—unfamiliar work. This may be true—we have no special knowledge on the subject. But if it is true, if workmen of one class can thus injure and annoy other workmen in their hour of need, what becomes of the class loyalty—not to say the humanity of labourers. Perhaps, however, the request sprang from the disinclination of the "aristocracy of labour" to work alongside men whom they regard as their industrial inferiors. If so, what about our democracy?

The demand for a complete cessation of immigration was very properly answered by the Premier. If we cannot increase our population at an exceptional rate, then we must stop the expenditure of loan money, and cease to float debentures. Our debt, which is a very large one now, would become an intolerable burden if we did not broaden the shoulder which has to bear it. Besides, no necessity for stopping all immigration has been shown. There is good reason for ceasing to import mechanics, and their importation is being stopped, but we see no limit yet to the employment of men on the soil. As

for the demand for protection, that was sufficiently answered by the deputation themselves. There is severe depression in the ironworkers' trade, and it was proposed that the Government should at once give orders to the foundries, to enable them to find employment, and that there should be protective duties imposed which would compel people requiring machinery in future to get it made here. Now it may be granted that if the Government would at once give orders to the foundries, there would be more work in town, but for how long? There were enough engineers in the colony a year ago—so a member of the deputation said—and that number has been largely increased. How many, then, of the unemployed ironworkers would find work if the Government gave orders for all sorts of machinery—whether wanted or not? What guarantee is there even that the ironworkers from the South, who are also in need of employment, would not come crowding here to share the benefit? We are not now regarding the interests of the general public; we are writing as if the whole body of the people were bound to tax themselves to provide work for the few mechanics who need employment, and we point out that even if the Government acted in this spirit they could only palliate, not do away with, the effects of the present depression.

The proposal to impose duties to compel all needing machinery to have it made here, would, if acted on, simply intensify the distress in the trade. Why was it that two or three years ago, when there was certainly no larger proportion of Government iron-work given to the foundries than they receive now,—why was it that these establishments were then full of business? Chiefly because the sugar industry found them employment. That industry has certainly suffered from the general depression in trade, but unlike the others, it has not been much affected by drought, and would probably have been in full swing now if it had been left alone. It is true that the bulk of the machinery was imported, but every ironworker knows that additions and repairs to that machinery furnished plenty of orders to the foundries. Why are these orders not coming in now? Because certain measures have been taken—protective measures intended to preserve white labour from outside competition. The result has been that capitalists engaged in the sugar industry have been content to hold their own, and have given up any attempt at expansion. No more scrub is being felled to make room for canefields, no more mills are being erected, and no more orders for machinery come in to the

foundries. Perhaps these protective measures were justified—we are not now concerned to argue the point—but the result has been a considerable decrease in the employment open to ironworkers. If we attempt to compel the sugar-growers and other machinery users to get their engines made here, as we are attempting to compel them to employ only a particular kind of labour, will not the result be a still further check to the erection of fresh machinery? You may, perhaps, compel a capitalist, who has made his investment, to submit to your regulations, but you cannot get an outsider to come in, except on his own terms. And it is on the coming in of outsiders—on the expansion of existing industries—that the ironworkers depend for future employment.

The conclusion of the deputation was an indefinite one. The Premier expressed his sympathy for the unemployed mechanics—a sympathy which everyone must share who knows what a heart-breaking task the search for work is in times like these. He virtually promised that if the inquiries of the Immigration Agent showed that relief works were absolutely needed, they should be started, and he also promised to do what he could, as trustee for the community, to alleviate the existing distress. He had promised as much before, and he could promise no more then. It was all that could be said. He could not undertake to do a wrong to the whole community and to cripple its future, simply because he pitied the distress of those before him and wished to relieve it.

DEAR SUGAR IN FRANCE.

The following letter from Paris is addressed to the *Glasgow News*, and gives some details as to how the French Exciseman is “squared” and the Government robbed:—

The French revenue last year showed a deficit of nearly £1,500,000 on sugar. Has the consumption diminished? Not at all. Has the price fallen? No. The money has gone into the pockets of the fabricant and refiner, partly in the form of drawback—that is of bounties on export; partly through sugar consumed at home escaping taxation. The explanation of this veritable scandal is that a new system of levying the duty came into operation at the beginning of the year. Instead of the manufactured article being taxed, the tax is levied upon the raw material, the beet. According to some, the

duty was fixed too low; according to others, the duty is not too low, but is on a large scale evaded.

Let us hear how this evasion is said to be practised, for it shows as artful and audacious a fraud as ever existed in our country in the time of the malt tax. The beet enters the factory, to be taxed on the weight, on the theory that it will yield a certain proportion of sugar. The exciseman is at the door to weigh the bulk. But suppose the exciseman is bribed. Like the unjust steward in the parable, he tells the fabricant to register a smaller quantity. It is true that the same exciseman is not always on duty, for there is a system of rotation, but the fabricant is equal to the occasion. He takes care that the beet is mostly delivered on the day when the man he has corrupted is in attendance. When there is an honest exciseman on guard, little or no beet arrives. The result is that if suspicion is excited it falls on the wrong man. "Surely there must have been a larger delivery the day that X. was on duty; it is very odd that his return is always so much lower than A's." The poor man is perhaps transferred to an inferior post, while the dishonest official gets promotion. But the excisemen may all be honest, or at least afraid of conniving at so gross a fraud. The fabricant has more covert ways of cheating the revenue. He tampers with the scales, so that on every heap that is weighed he gets a profit.

There is yet a third plan. The cask into which the beet is placed has a movable bottom, and, like the Danaides' sieve, what goes in at the top falls through an opening in the floor conveying it into a cellar. Of course it would not be safe to let this go on the whole time, otherwise the registered weight would be *nil*. At a given moment the movable bottom is made fast, and the beet no longer slips through, but is held fast and undergoes weighing. It might be thought that as at the end of every season the fabricant has to report the quantity of sugar produced, these frauds would come to light, but he is equal to the occasion. He has close by his works a field of very superior beet. If surprise is expressed that so small a quantity of beet as that on which he has paid duty should yield so much sugar, he points to this field. "Just pull up a plant and see how rich it is in saccharine matter." "Well, but," says the official, "if your beet is so rich it ought to pay a higher duty." "Perhaps it ought," replies the fabricant, "but the law taxes beet by quantity, and if I can grow a superior article, all the better for me, I am entitled to profit by it.

Raise the duty if you choose, but I warn you that other fabricants will make a great outcry, protesting that they will have to close their works, because they cannot produce so high a yield." Such is one explanation of the deficit, but there is another. The law of 1884 proceeded on the theory that beet should yield 6 per cent. of sugar. Some maintain that it yields 9 or 10, and will ere long, as in German refineries, yield 12 or 14. Thus every third sugar-loaf escapes duty, and as the refiner does not lower his price he pockets the money. Nay more, if he exports this untaxed sugar he actually gets a drawback or bounty on it. This drawback is supposed to be a reimbursement of the duty, but as no duty has been paid it is a clear bonus. The result of this is that the quantity of sugar produced rose from 360,000 tons in 1884 to 380,000 tons in 1885, and to 450,000 tons in 1886. As the home consumption has not increased, all this extra sugar has crossed the Channel, the French Exchequer kindly paying this money for the benefit partly of the British consumer, partly of the French refiner.

Unfortunately, beet does not find a congenial soil except in Flanders, otherwise we should see France turned into a gigantic beet-field, corn and vines being abandoned for the sake of this profitable root. In Germany, under a like system, the production of beet has doubled. Prince Bismarck shows no envy of the prosperity of the sugar industry, a prosperity paid for out of the public purse—the fabricants, it is true, not getting the whole of it, but having to fling a slice to the farmer in the shape of a slightly higher price for beet. Austria and Belgium are not quite so liberal. Austria has limited the bounties to four million florins, or £330,000; Belgium to 14 million francs, or £560,000. Germany, however, is gradually raising its rate of duty; that is to say, it is raising the percentage on the beet. This reduces the profits of the sugar companies on the home consumption, but the bounties are continued. The French Government is also contemplating a remedy, but nobody would guess what. As the fabricants are making exorbitant profits, the Government proposes that the duty shall be raised. The increased duty will, of course, fall on the consumer. A few years ago loaf sugar was 7d. or 7½d. a pound. M. Leon Say, being in possession of a surplus, reduced the duty by one-half, calculating that in a short time the consumption would double, and the revenue from sugar consequently be as large. Sugar has since been 4½d. or 4¾d., but the consumption has not materially

increased. Habits are not changed in a day, or even in a generation. Frenchmen use less than half as much sugar as we do. Some say it is because they do not drink tea, but the Dutch, though tea drinkers, do not use more sugar, nor the Russians, also tea drinkers, anything like so much. The truth is that the great majority of Frenchmen are peasants, and that the peasant lives as far as possible on his own produce. He is a poor customer for the grocer.

A hundred years ago France imported all its sugar. When Britannia ruled the waves in the wars with Napoleon the Prussian example of manufacturing sugar from beetroot was followed. The effect survived the cause. When peace came beet sugar continued to be made, especially as it was duty-free. Not until 1837 was the excise introduced, and even till 1864 the excise was lower than the customs duty. Native and colonial sugar have since been ostensibly on an equality, foreign sugar having a surtax which is virtually prohibitory, but the colonies have suffered by the new excise system. It is evident, indeed, that beet enjoys a kind of protection. It is not, however, so easy as it seems to levy the tax equitably. If, as at present, the duty is imposed on the raw material, an average has to be struck, for some beet is richer than others, though the fabricant takes care to pay the grower accordingly. If the duty is levied on the raw sugar, questions of colour and quality arise, and all sorts of devices are indulged in for deceiving the collector. The drawback is affected by all these questions.

It is true that in 1864 Great Britain, France, Holland, and Belgium agreed on a uniform drawback, but this Convention expired in 1874, and has not been renewed. The late Lord Iddesleigh, moreover, in his Budget of 1874 abolished the duty. It is far from certain that this was his most successful fiscal measure. Foreign countries have since been inundating us with sugar, and as these foreign refiners all receive bounties, while our refiners have none, the latter have been crippled or ruined. Economists, indeed, say, "If foreign countries choose to tax themselves so that we may have cheap sugar, so much the worse for them, and so much the better for us." This sounds very well in theory, but if the foreign sugar is less sweetening, the benefit to the community from Greenock or Bristol being ruined is questionable.* If I lived across the Channel I should prefer paying a little more for sugar, and a penny in the pound less income tax. I presume, however, that the duty once gone will never reappear. Here in France we have no income-tax, and we have dear sugar; but if the Radicals have their way we shall soon have both an income tax and dear sugar. Meanwhile the fabricants and refiners are making fortunes. It is a pity your Greenock establishments could not be magically transferred hither.

* The writer of this letter is evidently unaware that fully one half of the sugar refined in Greenock last year was made from beet.—ED. S.C.

RUSSIAN SUGAR BOUNTIES.

The following is a translation of an extract from the *Moscow Gazette* of the 13th (25th) December last, which was enclosed in a report by Mr. H. N. Dering, Her Majesty's Secretary of Embassy at St. Petersburg, respecting the repayment of sugar bounties:—

“Sugar speculators who had proposed to arrange, with the help of Government, stock exchange speculations on an unprecedented scale with regard to sugar and sugar shares, have made a mistake. In spite of influential intercession Government has rejected their proposals, not wishing to make such an important industry a sacrifice to speculation. The speculators were discouraged but not disheartened, and lost no time in making new proposals for the State to give them some assistance at least in the liquidation of their affairs. The efforts were successful, and a Committee of Ministers decided ‘to leave it to the Minister of Finance to allow those sugar manufacturers who, not being able to pay by December 1st of the present year the Excise sums due from them for the period 1885-86, and parts of the export premiums, may petition the Ministry of Finance for facilities in the payment of the sums due, to defer the payment of such sums till March 1st, 1887, with interest at the rate of half per cent. per month, each part of a month to be considered as a full month.’ In spite of its apparent inoffensiveness, this measure gives enormous facilities to the speculators for the liquidation of their enterprises, and, at the same time, unfortunately, considerably undermines the healthy manufactories and causes no slight loss to the Crown, which, of course, was not foreseen when the measure itself was hastily considered and confirmed. The fact is, that the great majority of these speculative works cannot continue their production, not only at the present low prices of sugar, but also at prices which would guarantee a good profit for well-organised works”

The Cunard steamer *Etruria*, which arrived in New York early in the morning of the 12th ult., made the shortest Transatlantic voyage—six days four hours and 45 minutes—from Fastnet to Sandy Hook, with an average hourly speed of 19 knots, in a total run of 2,108 miles. This is three hours quicker than the previous fastest voyage, which was also by the *Etruria*.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO JANUARY 31ST, 1886 AND 1887.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1886.	1887.	1886.	1887.
	Cwts.	Cwts.	£	£
Germany	455,065	477,041	347,886	362,378
Holland	31,224	2,213	23,316	11,285
Belgium	112,105	128,905	81,457	67,169
France	7	1,534	12	900
British West Indies & Guiana	280,877	296,463	259,750	228,849
British East Indies	77,064	7,100	44,662	3,100
China and Hong Kong	—	—	—	—
Mauritius	364	8,000	221	3,450
Spanish West India Islands	—	—	—	—
Brazil	147,937	56,830	105,412	30,925
Java	368,699	306,424	328,452	204,315
Philippine Islands	54,196	33,802	35,433	14,286
Peru	68,936	39,832	53,953	25,020
Other Countries	68,755	82,571	50,688	43,674
Total of Raw Sugars ..	1,665,229	1,458,715	1,331,242	895,351
Molasses	4,773	10,199	1,950	3,122
Total Raw Sugars ....	.....	.....	1,333,192	898,473
REFINED SUGARS.				
Germany	148,278	164,746	131,550	129,531
Holland	72,262	88,096	68,890	69,830
Belgium	10,341	7,643	9,995	6,622
France	31,110	136,571	31,589	101,869
United States	71,627	14,287	67,183	11,926
Other Countries	207,278	—	176,735	—
Total of Refined	540,896	411,361	485,942	319,778

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	10,292	5,759	7,784	3,048
Belgium	3,338	4,646	2,587	2,949
France	4,703	3,880	3,799	2,267
Portugal, Azores, & Madeira	7,928	6,495	6,058	3,879
Italy	970	10,552	765	6,384
British North America	330	1,019	304	605
Other Countries	26,508	22,464	22,378	14,634
Total	54,069	54,815	43,675	33,766

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of January compared with the corresponding month of the two preceding years, and the average monthly imports for the past year compared with those of 1883, 1884, and 1885, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"LUMPS AND LOAVES."						"OTHER SORTS," Including Crushed Leaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			Jan.	Jan.	Jan.	Monthly Average.			Jan.	Jan.	Jan.	Monthly Average.			Jan.	Jan.	Jan.
				Tons.	Tons.	Tons.				Tons.	Tons.	Tons.				Tons.	Tons.	Tons.
	1883	1884	1885	1886	1885	1886	1883	1884	1885	1886	1885	1886	1883	1884	1885	1886	1885	1886
France.....	3538	2737	2035	1402	2490	1268	2477	1621	546	2888	465	287	6015	4358	2581	4150	1555	6828
Holland	2352	3580	4247	3508	4916	2367	1853	1948	1555	1428	2019	1246	4205	5528	5802	4936	3613	4405
Germany & Austria ..	588	552	956	990	886	746	1854	2380	2859	6034	5474	6668	2442	2932	3815	7624	7414	8238
Belgium	319	183	214	344	185	389	124	151	116	113	119	128	443	334	330	457	304	382
United States	226	962	722	854	181	317	294	3386	10654	5078	2755	3254	520	4348	11376	5932	2936	3581
Russia .....	..	..	..	..	..	..	..	..	..	3412	..	10364	..	..	..	3412	..	10364
Other Countries .....	..	..	..	..	..	..	61	121	12	9	72	..	61	121	12	9	72	..
Total	7023	8014	8174	7158	8658	5087	6063	9607	15742	19362	10904	21957	13686	17621	23916	26520	19562	27044
						6791						13776						20567

SUGAR STATISTICS—GREAT BRITAIN.

TO FEBRUARY 19TH, 1887 AND 1886. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1887.	1886.	1887.	1886.	1887.	1886.
London	76	103	37	39	37	51
Liverpool ..	79	107	34	35	36	44
Bristol	3	5	8	8	7	6
Clyde	43	76	26	29	34	38
Total ..	201	291	105	111	114	139
	Decrease.. 90		Decrease.. 6		Decrease.. 25	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. FOR JANUARY, 1887 AND 1886.

	STOCKS.		DELIVERIES.		IMPORTS.	
	February 1st.		In January.		In January.	
	1887.	1886.	1887.	1886.	1887.	1886.
New York	80	35	56	53	50	42
Boston	13	7	10	6	8	4
Philadelphia....	1	2	9	6	9	6
Baltimore .....	..	..	..	..	..	..
Total.....	94	44	75	65	67	52
	Increase.. 50		Increase.. 10		Increase.. 15	

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, February 10th, 1887.

FAIR REFINING.	96o/o CENTFS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
Feb. 10, 1887.—4 9-16c.	5½c.	5 11-16-¾c.	5 5-16c.	Jan. 1, 1887—102,279 tons.
Feb. 11, 1886.—5½c.	6c.	6 7-16c.	6 1-16c.	Jan. 1, 1886— 57,328 tons.
Feb. 12, 1885.—5c.	5½c.	6 3-16c.	5½c.	Jan. 1, 1885— 89,186 tons.
Feb. 14, 1884.—5½c.	6¾c.	7½c.	7½c.	Jan. 1, 1884— 60,900 tons.
Feb. 15, 1883.—6 15-16c.	7½c.	8¾c.	8¾c.	Jan. 1, 1883— 50,297 tons.
Feb. 16, 1882.—7c.	7¾c.	9½c.	8¾c.	Jan. 1, 1882— 43,927 tons.
Feb. 17, 1881.—7½c.	8 1-16c.	9 1-16-½c.	8½c.	Jan. 1, 1881— 66,999 tons.
Feb. 12, 1880.—7½c.	8 1-16c.	9¾c.	9c.	Jan. 1, 1880— 63,558 tons.
Feb. 13, 1879.—6¾c.	7 3-16c.	8 7-16-½c.	8½c.	Jan. 1, 1879— 50,773 tons.
Feb. 14, 1878.—7½c.	8c.	9½c.	8½-9c.	Jan. 1, 1878— 48,230 tons.
Feb. 15, 1877.—9¾c.	10¾c.	11 15-16c.	11 1-16c.	Jan. 1, 1877— 25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST JANUARY, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
198	265	69	397	167	24	1120	1096	970

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST JANUARY, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
1162	473	44	378	186	337	2580	2579	2465

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP,
OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1886-87.	1885-86.	1884-85.	1883-84.
	Tons.	Tons.	Tons.	Tons.
France.....	500,000 ..	298,407 ..	308,410 ..	473,676
German Empire ..	1,012,500 ..	838,131 ..	1,154,817 ..	986,402
Austro-Hungary....	525,000 ..	377,032 ..	557,766 ..	445,954
Russia and Poland ..	475,000 ..	537,860 ..	386,433 ..	307,696
Belgium	95,000 ..	48,421 ..	88,463 ..	106,586
Holland and other Countries.....	50,000 ..	37,500 ..	50,000 ..	40,000
Total.....	2,657,500	2,137,351	2,545,889	2,360,314

The only alteration made by Mr. Licht this month is in his estimate for Germany, which he has raised by 37,500 tons. As compared with Mr. Licht's first estimate for the present campaign (see *Sugar Cane* for September, 1886, page 503,) the increase is 157,500 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The market for the last month, for both raw and refined sugars, has been decidedly dull, and prices for beet and most kinds of cane may be quoted at 6d. per cwt. decline. Beet 88% is now 10s. 6d. f.o.b., prompt, which is the lowest point it has touched since January, 1885; notwithstanding this, there is no disposition to buy beyond immediate requirements.

The stocks in this country, as compared with a year ago are 90,000 tons less, but the stocks of beet are known to be large on the Continent, and the uncertainty as to their extent has much to do with the lack of spirit in this market.

On the 19th February, the deliveries in the United Kingdom show a decrease of 6,162 tons, as compared with the same period of 1886, and the imports a decrease of 25,037 tons.

The stocks in the United Kingdom, on the 19th February, were 200,722 tons, against 291,547 tons in 1886, same date.

Present quotations for the standard qualities, as under, are:—

FLOATING.		Last Month.
Porto Rico, fair to good Refining	10/6 to 10/- against	11/- to 11/6.
Cuba Centrifugals, 96% polarization	12/6 to 13/- ,,	12/9 to 13/-..
Cuba Muscovados, fair to good Refining..	10/6 to 11/- ,,	11/- to 11/6.
Java, No. 14 to 15, good to strong	13/- to 13/6 ,,	13/6 to 14/-.
LANDED.		Last Month.
Madras Cane Jaggery.. .. .	8/- to 8/9 against	8/- to 9/-.
Manilla Cebu and Ilo Ilo	8/- to 8/6 ,,	8/- to 8/6.
Paris Loaves, f.o.b.	15/- to 15/6 ,,	15/3 to 15/6.
Titlers	17/- ,,	17/3
Tate's Cubes.. .. .	18/9 ,,	19/3
Austrian-German Beetroot, 88% f.o.b. ..	10/6 to 10/7½ ,,	11/1½ to 11/3.

THE SUGAR CANE.

No. 213.

APRIL 1, 1887.

VOL. XIX.

~~For~~ The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

A Malaga correspondent (*Manchester Courier*, 28th February,) states that the destruction of sugar owing to the recent severity of the weather in that district amounts to at least 25,000 tons.

The Halle Sugar Refinery Company, says *Kuhlows*, have resolved to close one of their establishments until an improvement in prices sets in. The works in question have only been in operation about a year, and necessitated an increase of capital of £50,000.

Messrs. Netherclift & Anderson, of 4, Fenchurch Avenue, E.C., notify that they have arranged with Mr. John Andrew Macdonell Bonar to continue the business of the firm, under the name or style of Anderson, Bonar & Co.

Mr. Baden-Powell, M.P., intends, on an early day, to call the attention of Parliament to bounties on exports and shipping, and to the consequent violation of the principle of the "most-favoured-nation treatment."

"The sugar refiners of Montreal," says the *Montreal Trade Bulletin*, "have not been able to boast of as flourishing a record during the past year as that which characterized their earlier history, owing to the losses incurred upon importing the raw article, combined with the continued depression and low prices of the refined product. The losses upon importing raw sugar have been astounding, the depreciation of prices between the dates of purchase and delivery having ranged from \$10,000 to \$30,000 on single cargoes, and the aggregate

amount lost by one of the refiners is placed by competent authorities at about \$150,000 on the season's business. It is stated that the refined product last year, in some instances, was sold at under the cost of the raw material laid down here."

On the 11th ult., as previously advertised, Mr. James Duncan's large refinery, known as The Clyde Wharf Sugar Refinery, on the Thames, was put up to auction in one lot by Messrs. Fuller, Hornsey, Sons & Cassell, at the Mart, Tokenhouse Yard, E.C.

The works are stated to have cost upwards of £300,000, and to be the largest (single) refinery in Great Britain, having a capacity of turnout of 1,800 tons weekly.

The upset price was fixed at £92,000.

The trade was well represented at the sale, but from the fact that not a bid was made, and scarcely a question asked, it would appear that those present went out of curiosity rather than with any view to business.

The property was therefore not sold, and the auctioneer expressed the hope that he might soon meet with a purchaser by private contract.

We have before us the results of the working of two neighbouring estates in the West Indies, of the crop for the year 1884, in which year the price of sugar reached its lowest level.

Estate A made 315 tons of muscovado sugar, and cleared \$8,000. Capital invested, \$100,000; so that it realised 8%.

Estate B made 278 tons superior vacuum pan sugar, and cleared \$20,000. Capital invested, \$105,000; so that it realised 19%.

Both estates are carefully and very economically managed by the owner, who resides on the spot. All purchases are made for cash. The stores he pays for he sees that he gets. There is no mortgagee and mortgagee's broker to reckon with; had there been, the result might have been on the other side.

When the new refineries are erected at Rosario de Santa Fe (Argentine Republic), the imports of sugar into the Republic will cease, as these works are under State supervision, and none but home sugar will be allowed to be used.

We have received a circular (which we give at page 205) from the British and Colonial Anti-Bounty Association, which looks like business. The committee is a very influential one; both planters and

refiners are well represented upon it, with Mr. Nevile Lubbock as chairman.

In another part (page 214) we reproduce an article which appeared in the *Statist* of March 19th on the sugar bounties. In it, it is stated, that it is reported that as one result of the working of the French Sugar Law, two refiners in Paris—presumably M. M. Leon Say and Lebandy—are each clearing annually about £450,000, *in addition to the ordinary trade profit!*

We also give (page 177) Mr. Herbertz's opinion upon the working of the German Sugar Law. Mr. Herbertz, whose authority on Continental sugar questions few will be disposed to doubt, has long held advanced views on the bounty system—he advocates the abolition of bounties, and, by reducing the tax on sugar, lessening its cost, and so increasing the consumption at home—and in this way the consumer and the Treasury would both be benefited.

Bounty is only another name for fraud, as is shown by W. P. B. S., in his short (but to the point) paper on German Sugar Bounties. (Page 173.)

If our Government could only be induced to even threaten to put on a counteracting duty, bounties on sugar would soon become a thing of the past.

We are indebted to Sr. Don Santiago Dod, editor of the *Nueva Era* (Roque, Cuba), for sending us what appears to be a very interesting paper, in Spanish, of some 50 pages, written by himself, on the cultivation of the sugar-cane, with the desire of bringing to bear on this subject some degree of the practical knowledge of agricultural chemistry and scientific treatment of the soil and its productions which have been so eminently successful in their application to the beet root cultivation.

The writer details the various processes in use in the Island of Cuba, and points out what he considers their defects, in most cases adding valuable suggestions and details as to methods employed in other cane-growing countries which might be applicable in Cuba. The treatise cannot fail to be of use, and is sufficiently concise not to be tedious. It apparently forms part of a publication entitled “*El Tesoro del Agricultor Cubano*,” and is supplemented by a classification and short description of the leading varieties of cane grown in Java, China, Singapore, Jamaica, Louisiana, and Brazil, particularly that known in Guadaloupe as “*Canne de Salangore*.”

We have received from M. Daruty de Grandpré, President of the Société d'Acclimatation of the Island of Mauritius, the first number of the *Revue Agricole*, a journal brought out under his personal direction, with the special object of promoting the interests of the agriculturists, planters, and sugar manufacturers of Mauritius, Réunion, and Madagascar. We are glad to notice, and to the best of our ability to second, any effort put forth to meet the present very critical state of matters in sugar-cane growing countries, and it is really rather surprising that, under such circumstances, no periodical journal should hitherto have been brought out to give the necessary publicity to all information respecting the progress of agriculture, planting, and manufacture, which is so urgently required. A short resumé of the rise and progress of the sugar industry, given in this first number, is interesting without being tedious, and forms an appropriate introduction to that portion of the journal which will continue to be devoted to the interest of sugar planting. Other papers devoted to other plants and natural productions, the cultivation of which may be found profitable in replacing (should this become necessary) the cane plant, seem to be practical and suggestive.

We cannot but wish well to the new undertaking, and, feeling convinced that "in the multitude of counsel there is safety," we welcome this addition to the means of introducing and disseminating knowledge of a kind of which we cannot have too much. We have been glad, in the past, to give such publicity as our space permitted to the reports of the Chamber of Agriculture of Mauritius, but the establishment of a regular journal, such as the present, is much more likely to be productive of permanent good.

The following we take from *Messrs. Willett, Hamlen & Co.'s Circular* :—

TOTAL STOCKS IN PRINCIPAL COUNTRIES.

	1887.	1886.
United States (all hands), Feb. 1	114,020	53,298
Havana and Matanzas „	36,795	33,130
United Kingdom „	197,976	285,307
Germany „	397,300	356,394
France „	267,422	299,418
Belgium „	51,064	57,260
Holland „	68,497	41,613
Austria and Hungary „	167,300	96,000
Total, February 1	1,300,374	1,222,420

THE GERMAN SUGAR BOUNTIES.

CONSUMPTION TAX,—NO DRAWBACKS,—NO FRAUDS,—NO BOUNTIES.

A movement has sprung up in Germany for the purpose of stopping export bounties on sugar by a tax on the finished product as it goes into home consumption, thus freeing sugar for export of all duty, and therefore the revenue from all claim for repayment of duty. In the abolition of "drawbacks" of duty on export of sugar lies the only security against frauds on the revenue. The Germans thus seem to be alive to the well-established fact that no system of taxation and drawbacks on the basis of estimated yields can prevent the revenue being diminished by "repayments" of unpaid duty. The export bounties have their origin in these revenue frauds.

It is equitable that no merchandise should be exported with the burthen of specific taxation upon it: hence rebate on export of duty paid. But no nation has yet openly consented to repay in drawback on export more than the duty paid. When export bounties were given by us on corn, they were openly given and not fraudulently obtained.

If the beet sugar is so inferior as to require an export bounty in aid of the natural market price, it would be sounder policy to grant the aid of the public purse openly, instead of allowing it to be stolen. To supply a direct stimulus to fraudulent drafts on the national exchequer is the outcome of the existing fiscal legislation on the Continent for the taxation of sugar. If the promoters of the present movement in Germany for the suppression of bounties can make the taxpayers understand that a large number of the beet sugar factories and refineries are being conducted on the principle that their profits depend upon defrauding the revenues of the nation, the success of the anti-bounty crusade will be certain.

The question arises—Can we in England aid the Germans in stopping this nefarious operation of an unsound system of taxation? We think we can in more ways than one. If the Germans abolish their sugar drawback, and then take their stand upon the most-favoured-nation Article, and call upon the British Government to deal with bounty-aided exports from other countries in such a way as to restore the equality of international competition intended by that treaty Article, it is difficult to see what justification the British Government could plead for non-performance of such a treaty obligation. We might also have, in readiness for an international

conference, legislative power reposed in the Government to levy a countervailing duty, and thus, in the common interest of all nations, render nugatory, because profitless, this fraudulent bounty system. The sugar industry of the British colonies does not complain to the Government of low prices as such, but of the fact that the Continental beet sugar industry is not compelled to compete at the same market price as the British industry, but adds to the market price the amount of the bounty, and so obtains a higher level of price. The whole bounty question in its public aspect has nothing whatever to do with high or low prices, but with the differential prices created by this inequitable and fraudulent drawback system. The British sugar industry must be satisfied with the market price of sugar, whether high or low, provided that it is governed by the same natural operations as govern the prices of other merchandise. When the foreigner is content with the natural market price—nothing more and nothing less—then the British sugar industry will have no ground to complain of his competition in our national market.

W. P. B. S.

DEATH OF MR. WILLIAM McONIE, JUNR.

The announcement of the death of Mr. William McOnie, son of Ex-Lord Provost McOnie, which took place at his residence, Eversley, Pollockshields, on Wednesday (March 9), caused some surprise in the city. Mr. McOnie, who was only 36 years of age, had the promise of a bright future. He was born in Glasgow, and received his education at The Grange, Sunderland. On his return home he entered the service of Messrs. Randolph, Elder & Co., where he served an apprenticeship as an engineer. He ultimately became a partner in the well-known firm of Messrs. W. & A. McOnie, Scotland Street Engine Works, and on the retiral of his uncle and his father in March, 1886, the business fell into his hands, the firm being then altered to that of Messrs. W. & W. McOnie. When the proposal was made to have an International Exhibition in Glasgow, Mr. McOnie entered heartily into the scheme, and was placed on the Engineering Committee, where his professional qualifications would have been most valuable. The firm to which he belonged has long been famous for the production of sugar-making machinery, and we understand that the business in all its departments will be continued under the superintendence of Ex-Lord Provost McOnie. The deceased gentleman, who was highly respected by a large circle of friends, leaves a widow and five young children.—*Glasgow Herald*.

WHAT A WEST INDIAN SUGAR PLANTER HAS TO SAY.

The fertility of the majority of the lands in the West Indian Islands and countries on or near the tropics has such a world-wide reputation that its advantages and peculiarities do not need to be now repeated here.

An agriculturist from other countries, and climates less favoured by nature, probably wonders how or why the owners of such fertile lands stick with such a tenacity to the cultivation of the sugar cane, when figures show that the condition of the consuming markets and over-production in the world should compel planters to give up this staple, and turn their attention to the cultivation of more profitable productions from the soil.

The immense variety of marketable productions which such rich lands could be turned to, would make an agriculturist of the cold regions imagine that the brotherhood at the tropical countries should always be rich men, with twelve months in the year of green foliage, plenty of water and sun, and no stoppage of navigation or communications in winter.

And yet the agriculturist of these rich tropical countries is, in many instances, poorer than the brotherhood in the cold regions, where vegetation only makes a show for six or seven months in the year.

An agriculturist in Iowa, Wisconsin, or Michigan will buy 40 acres of *good* land, for which he will pay at the rate of \$20 per acre, and make a fair living by cultivating wheat, oats, rye, corn, potatoes, or probably raising hogs. He will have, or try to have, with him improved agricultural implements.

Now let us see what the West Indian agriculturist does. Probably he will be able to buy also 40 acres of good land at the same price mentioned above, but let us see what he will do with them by cultivation. He will easily find out that at present "coffee" pays the best to the agriculturist. If we take, for instance, Havana (the largest West Indian market), will dispose of the coffee at from \$20 to \$25 per cwt. But it happens that a coffee tree wants from three to four years of development to show for her first time a coffee flower or grain. The agriculturist, a man of small means, cannot wait four years. He *must live* from the work that he accomplishes during a few days, weeks, or months, but cannot wait four years. He cannot starve.

The owner of a sugar plantation knows that by turning his lands into a coffee plantation he may again be a prosperous man, but he has no funds placed aside to fall back upon during four years, and his creditors (in our days most have them) will not permit him go into such transformation. He must continue planting sugar cane.

Here we reach the point where the small and the large West Indian agriculturist cannot build up coffee plantations, on account of the special circumstances just described.

The coffee plantations now in existence in the West Indian Islands or in the tropical countries were established many years ago, or are upon new lands placed into cultivation for the first time.

Next to coffee, let us mention "tobacco." It is a known fact that good tobacco of paying quality grows only in certain parts of the West Indian Islands. Bad or poor tobacco grows everywhere, as we should say. Good qualities for export fetch say at from \$30 to \$40 per cwt., at places where transportation is not an expensive item.

Tobacco, even if fetching a fair market price, is one of those tropical productions which offer but a small inducement to a West Indian agriculturist. To cultivate tobacco successfully it is necessary to be an expert. Soil, climate, watering or rain, freedom from ants and other insects, each are points of capital importance. Scientific agriculturist have wisely classified the tobacco plant to be more of an horticultural nature than adaptable for cultivation at large.

Orange or lemon groves meet the same difficulties as described for coffee. The cultivation of herbs or vegetable is poorly remunerated, by selling the basket-full (a yard in diameter by half a yard deep) of a kind for 25 cents, and sometimes for 10 cents. But what about corn selling twice a year at \$2 per 1000 ears, and sweet potatoes at 25 cents per bushel!

The forementioned facts brings us to a recapitulation, by which it is thoroughly ascertained that the West Indian plantation owner is compelled, by special circumstances, to continue being a sugar cane cultivator, in spite of commanding superb lands, and *must* produce sugar at the ruling market values, or consign his lands to abandonment.

MR. HERBERTZ ON THE WORKING OF THE PRESENT GERMAN SUGAR LAW.

Mr. Herbertz, in a recent number of the *Deutsche Zuckerindustrie*, gives the probable results, to the revenue, of the working of the present bounty system in Germany for the current campaign, which show a loss to the German Treasury of £1,500,000 sterling. He considers the present a very favourable opportunity for an European Convention, for the purpose of very considerably reducing if not entirely abolishing bounties. After remarking that there is now no doubt whatever that the law of the 1st June, 1886, which was intended to have for its result the securing of an adequate contribution to the Imperial Treasury from the tax on sugar, will fail in attaining that object, he gives a calculation of the results of the year as follows:—

The quantities of beets worked up will amount, in round numbers, to 8,300,000 tons, which at 17/- (17 marks) per ton of beets, makes an income of	£7,050,000
The yield from the beets, according to official returns with regard to the masses-cuites up to the end of November, will reach 11·95 per cent. of raw sugar equal to	991,850 tons.
The amount of sugar obtained in the establishments specially extracting from molasses, may be put down at	33,150 tons.
Total production estimated at.....	1,025,000 tons.
The home consumption will amount to about....	425,000 tons.
Leaving, therefore, for export	600,000 tons.
These 600,000 tons, with a drawback of £9 (180 marks), will constitute a payment of	£5,400,000
Which, being deducted from the receipts (£7,500,000), will leave	1,650,000
Expenses of collection (4%) to be deducted	282,000
There will remain	£1,368,000
Add to this, receipts from duties on imported sugar and syrups	£72,000
Making the total net revenue.....	£1,440,000

Very likely the quantity of 600,000 tons assumed as being available for export, may not all be exported by the end of the fiscal year, and the reduction of the drawback on raw sugar does not come into operation until the 1st October next, and so a less sum than £5,400,000 will go out. But the result is only delayed, and the deficit will come off the receipts of the following year.

The figures assumed may not be quite in accordance with the eventual results, but they will not be far off; and, even if the total should be one or two million marks more in favour of the Treasury, the result will be far from being anything like adequate.

Mr. Herbertz makes a calculation for the year 1887-88, and comes to the conclusion that no more favourable result, but the contrary, must be looked for.

He considers that no eventual satisfactory settlement of this question can be looked for except in an international agreement, if not for the abolition, at any rate the utmost possible reduction in the bounty on export. The present time he thinks extremely favourable; the English Government, under the pressure of the refiners and her colonial planters, is making continued efforts to get a general congress, and, as has been stated in the House of Commons, with some success. The Sub-committee appointed to consider the new law on sugar taxation in the Austrian Parliament, adopted unanimously a resolution asking the Reichsrath to support any international action for the adoption of bounties on exportation. In Belgium there is yearly complaint made of the poor results from the sugar tax, because of the bounties, and Holland would probably welcome a congress in view of the critical state of the sugar industry in Java.

Mr. Herbertz then proceeds to make the following pertinent remarks :—

The French Treasury is losing at the rate of 82,000,000f. (£3,280,000) a year (not including the great quantity of duty free sugar from the refiners).

The loss suffered by Germany falls far short of this sum, but is nevertheless frightfully great. Let us take the preceding year's working, because we possess the exact figures; the account then stands as follows :—

The manufacturers paid duty on 7,070,316 tons of beets, at 16s. per ton	£5,656,253
They produced 838,104 tons of raw sugar, and received in taxes, whether from the State on exported sugar or from the consumer (in the enhanced price), £9 per ton	7,542,934
Loss to the Imperial Treasury and consumer .	<u>£1,886,681</u>

In Austria the State has secured for itself a fixed sum, by the principle of contingent contributions; the export, therefore, does not come into consideration, but the premium must be calculated according to the consumption, as the bonification of the tax (4fl. 70c. per cwt., or 7s. 10d.) to the manufacturer is paid by the consumer in the price of the sugar, and the contingent contribution must be deducted from the sum so received. We estimate the consumption for the working year 1885-86 at 260,000 tons, which, at £7 16s. 8d. per ton, gives a sum of..... £2,036,667

The contingent contribution of the manufacturers amounted to	1,000,000
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There was thus paid in sugar duty more than received by the State	1,036,667
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The loss in Belgium, on the receipt from the sugar duty, is greater than in any other country, taking into consideration its size; there would probably be no receipts at all if the law of 1861 had not fixed £240,000 as the minimum. The magnitude of the premium to the manufacturers, and of the loss to the Treasury, can, in this case, only be calculated from the probable consumption. This will certainly not be too high estimated at 22lbs. per head, if we consider that for the whole of Germany, which includes many districts which are barren and possess few industries, we have already reached 20lbs. per head.

This gives, for a population of 5,850,000 souls, 58,500 tons, and this consumption, with a duty of £18 per ton, ought to bring into the Treasury	£1,053,000
But the actual receipts of late have only reached	240,000
The loss to the State thus amounts to	<u>£813,000</u>

The consumption per head in Holland will probably be greater than in Belgium, for Adam Smith informed us 100 years ago in his "Wealth of Nations," that in England and Holland even the labouring classes consumed sugar.

Let us then assume, to simplify the calculation, that the consumption

amounts to 22lbs. of <i>refined</i> sugar per head, this will give, for a population of 4,336,000 souls, 43,360 tons, which with a duty of £22 10s. per ton—of refined sugar—should bring	£975,600
The receipts for the year 1886 only reached	665,945
The loss was therefore	*£309,655

THE “*BERLINER TAGGEBLAT*” ON THE GERMAN SUGAR BOUNTIES.

The *Berliner Taggeblatt* has taken up this question warmly. Commenting on the report that the German Government are seriously considering a bill for the reduction of the bounty, it states that the losses incurred by the Treasury under the present system instead of being twenty to twenty-five millions of marks, as had been stated, are really far greater, and amount to fifty-four to sixty-two millions of marks, or about three millions sterling. This loss will never be totally got rid of so long as the present system continues. The proper remedy would be to tax the manufactured sugar on going into consumption. The tax might be reduced to 15 marks per 100 kil., which, on a consumption of 400 million kilos, would yield a revenue of sixty million marks. This would give a surplus of 42 million marks compared with the present revenue of 18 million marks, and be quite sufficient to meet the demands of the military budget.

A committee appears to be considering the matter, and the Government proposes to ascertain the opinions of competent persons connected with the trade and industry. The tendency in official circles seems to be to maintain the present system, and to obtain more revenue either by reducing the bounty or raising the duty. The writer strongly condemns both these proposals, and urges that the only real remedy is to levy the duty on sugar going into consumption. An increase of duty would reduce consumption and further increase the already overburdened stocks. On the other hand, an entire change of system would enable a lower duty to yield a largely increased revenue. The Liberal party has always predicted the loss which the revenue would sustain under the present system, and it will continue to urge the adoption of duty on the manufactured product as the only effectual remedy.

*In reducing Mr. Herbertz's figures to English equivalents, we have taken the mark as one shilling, the florin as 1/8, 25 francs to the £, and 10 metric centners to the ton.

SUGAR INDUSTRY IN ANDALUSIA.

The following is an abstract of a French Consular report from Malaga on the Sugar Industry of Andalusia:—

After giving some account of the primitive methods of manufacturing sugar, which existed in Andalusia up to about 1830, and stating that even up to the present day there exist small works which exclusively supply molasses, for direct consumption, which have kept to the old practice, and carry on operations exactly as in the days of the Moors, it goes on to speak of

CULTIVATION OF THE CANE IN THE PRESENT DAY.

The sugar zone forms a more or less narrow band which follows the sea coast from Gibraltar up to the neighbourhood of Almeria, with a superficies of about 3,120 acres. The most important centre of production is in the province of Granada, at Motril, and Malaga only occupies a second place.

The planting is done in March and April, as soon as the factories commence crushing. The land having been previously broken up and manured, small ditches are dug three-quarters of a yard apart, on the slopes of which are placed horizontally two continuous lines of canes with joints. Each eye throws out a bud, or shoot, which will be ready for cutting the following year.

As to the stock, it furnishes from five to seven crops on an average, fifteen at the utmost in some exceptionally favoured regions, after which it must be rooted up, and the soil allowed to rest before re-planting.

About seven and a half tons of cane are required for planting an English acre, which, at £2 per ton, is equal to an outlay of £15, the expense of cultivation, labour, and manure amount to £24. The average production is 16 tons per acre, which is equivalent approximately to one and a quarter tons of manufactured sugar.

Some sugar manufacturers, it is true, assert that the cane yields them as much as 10 and 11 per cent. of sugar, but even admitting that they were not slightly exaggerating, this would be in any case an exceptional yield, and one year differs from another in this respect.

I have, continues the French Consul, made my calculation on the basis of an average yield of 7 to $7\frac{1}{2}$ per cent.

Weeding is indispensable several times after the planting, and, for the old plantations after cutting. In both cases manuring is done in July with guano, which is put in the ground along the trenches.

Neither new nor old plantations can dispense with being watered every twenty or thirty days during the four months of the hot season, namely, from June to the end of September.

The cane begins to sprout in April or May, and the cutting is commenced at the end of March in the following year, lasting from two to two and a half months.

The shoots which are cut in one year are called "tercios," and they are recognised by joints from eight to ten inches apart. It often happens, however, that the shoot of one year has not attained the length required by the manufacturer, whether from its springing from too old a stem or because it has suffered from bad weather or some defect in the cultivation, and cannot therefore be cut until the second year of growth; it is then an "alifa," the joints of which are not more than $1\frac{1}{8}$ to $1\frac{1}{2}$ inches apart. Being more woody than the tercio, it contains less juice, but more crystallisable, which accounts for its being higher in price. The price of the tercio at Motril has varied this year from 44 and 50 centimes the arroba (25lbs.), equal to, say, $37\frac{1}{4}$ per ton, the alifa fetching three centimes more. It must be remarked that the expenses of cultivation for the second year are insignificant, but it is any way a lost year, and the difference in price is insufficient to compensate the loss in that respect to the planter.

If the sugar cane in tropical countries is submitted to regular and constant saccharimetric analyses, it is found that it steadily loses its glucose in proportion as the hot days of March, April, and May are reached; or more exactly, the glucose is being constantly converted into crystallisable sugar, and the transformation is complete when the cane has reached perfect maturity. This is not quite the case in Spain, where the cane does not completely ripen, and even at the end of May it retains more or less glucose to the saccharine content, *i.e.*, to the crystallisable sugar, and the glucose combined, varies in the shoot of one year between 5 and 20 per cent. according to the time of year and the season, and according as the plant has, or has not, suffered from cold, which hinders the transformation of the glucose. The proportion in the alifa is only from 2 to 3 per cent., which shows that it has much more nearly reached a state of maturity, or, in other words, that the sugar cane in Andalusia requires two years to ripen. The evil is that it does not pay the cultivator to produce the alifa exclusively, and so the manufacturers scarcely use any but the tercio

in spite of the larger quantity of glucose, which causes them considerable trouble.

PRESENT METHODS OF MANUFACTURE.

Leaving out three or four small molasses factories, there are at present 28 sugar manufactories, of which number three at Cordova or Granada, which make beet sugar, do not concern us. Of these 25 factories, which vary very much in size, there are three in the province of Almeria, nine in Granada, and 13 in Malaga. Five have not been started this year because of having failed, or from insufficient production of cane, two of which are at Adra, one at Motril, and two in the province of Malaga.

The quantity of cane worked up in the 25 factories is *said* to have been, in round figures, 171,000 tons in 1883, 195,000 tons in 1884, and 216,000 tons in 1885, which, calculating upon an average yield of $7\frac{1}{2}$ per cent., means approximately a production of 12,000 tons of sugar in 1883, 14,000 tons in 1884, 15,500 tons in 1885.

The cane ferments very quickly, and can only be cut as required by the works, where it is at once crushed by mills with three cylinders in horizontal contact. The cane passes thrice through the mill, running at a speed of $1\frac{1}{2}$ to 2 revolutions per minute; and according as it is *alifa* or *tercio*, it gives from 71 to 76 per cent. of juice.

In the French colonies, the cane is only subjected to one crushing, which gives about 60 per cent of juice. The bagasse looks almost like wheat straw, and it is generally used as fuel to heat the steam boilers. The bagasse, however, still retains a considerable portion of juice, since the cane has only parted with 71 to 76 per cent. of juice in the mill, whilst it contains 88 to 90 per cent.; and this has given the Marquis of Larios, one of the principal sugar manufacturers of Andalusia, the idea of heating the bagasse by the diffusion process.

Seconded very ably by his son, who has been at the French *école centrale*, and by a young French engineer, M. Germain, of the same school, the Marquis has, with this intention, made some changes in the diffusion apparatus employed in the beet factories, and has thus completely succeeded in exhausting the bagasse. The juice obtained is indeed poor in density, but clarified and purified separately, it can eventually be added to the juice from the mills. The juice is carried, on issuing from the press, into the defecating boilers, where lime is added, and the whole rapidly raised to 100° by steam heating. The

lime, combining with the acids of the cane salts, produces insoluble salts, which are precipitated, the albumen becomes coagulated, and the impurities having risen to the surface in the form of a greenish mass, the juice, which has become clear, may be drawn off, the diffusion juice is defecated in the same manner, but with a smaller quantity of lime. The greenish scum is submitted to pressure, when it parts with the juice which it held, and the residue constitutes, along with the tails of the canes, the sole food of the mules employed in carrying the crop.

The operation is continued by the filtration of the clear juice through bone black, when it passes into the triple-effet evaporating apparatus in which it is concentrated in vacuo to a density of 28° B. After a second filtration it is evaporated up to crystallisation in a single-effet apparatus for boiling in vacuo. The triple-effet is heated by the exhaust steam of the engines, and the boiling apparatus by direct steam.

The crystallised mass is turbinéd in the cylinders of 75 to 80 centimetres diameter (30 to 32in.), which turn on vertical axles at the rate of 1,200 revolutions per minute. The centrifugal force drives the water of crystallisation through the metallic cloth which forms the walls of the turbine, and when nothing remains but the crystals, they are washed by throwing successively into the apparatus in motion, first syrup of sugar, then clear water. This first product of sugar is in the form of very fine white grains, which are sometimes reduced to powder; it is sold for direct consumption in both these forms.

The residue from the turbines is the molasses, which still retain much sugar. It is again boiled in vacuo and supplies the second product, sugar which is turbinéd like the other. Re-boiled in its turn, the molasses ensuing from this second operation furnishes the third product and, proceeding thus, sugars of the fourth and even fifth product are obtained. The crystallisation of these molasses is effected in earthen reservoirs. All these lower products are more or less brown according to their degree of manufacture. The best are used in different industries, such as chocolate and confectionery. The commonest are melted down, and a new boiling in vacuo brings them to a less dark shade. The molasses of the fifth product cannot be crystallised, but are used for making alcohol. They are fermented after being diluted with water, and the rectification of the watery products (flegmes) of their distillation gives an alcohol of 95°, which is used for strengthening the Malaga wines.

STATISTICS.

Extent of the Industry.—I have already said that the plantations cover a superficies of, say, 19,500 acres, at the rate of £176 per acre. They would represent about £344,000, to which must be added £1,000,000 expended in erecting works and for machinery.

On the other hand, the cost of cultivation amounts annually to £216,000, and that of manufacture to £600,000, namely:—

	£
180,000 tons of cane	360,000
Cutting and transport of works	465,000
Cost of manufacture, properly so-called .	194,400
	<u>£601,200</u>

These figures are somewhat above the mark, as they are taken from a request for alleviation of taxation addressed to the Government by the manufacturers. The approximate yield is 250,000 tons of cane, from which must be deducted 20,000 tons necessary for renewed planting, making 230,000 tons, worth £450,000 to £500,000, and capable of producing £650,000 worth of sugar.

I do not possess information sufficient to enable me to estimate, in any way, the production of molasses and alcohol. The works burn only Newcastle coal, and consume 16,000 tons annually.

The machinery was constructed wholly abroad. Two-thirds are of French manufacture, the remainder comes from England, principally from Glasgow.

The British machinists have supplied the greatest part of the mills and the steam boilers, whilst the evaporating apparatus, turbines, &c., have been principally obtained from the Fives-Lille and the Cail Companies.

QUANTITY OF CANE WORKED UP IN 1883, 1884, AND 1885.

	Prov. of Granada.		Prov. of Malaga.		Prov. of Almeria.	
	Tons.		Tons.		Tons.	
1883	88,940	....	75,998	....	6,502	
1884	119,193	....	65,241	....	11,001	
1885	120,439	....	85,751	...	10,020	
	<u>328,572</u>	....	<u>226,990</u>	....	<u>27,523</u>	
1883.			1884.		1885.	
171,440		195,435		216,210		

This year the amount will scarcely reach 140,000 tons, but the yield in sugar will be notably above that of the three preceding campaigns, in which it was really very poor.

TAX ON SUGAR IMPORTED FROM ABROAD AND FROM SPANISH COLONIES.

The discouragement caused by several bad seasons has resulted in certain districts in a notable reduction in planting, but this is only a temporary occurrence, and the culture of the cane may all the same be considered as occupying the whole of the districts which are suitable for it; in a word, as having obtained the maximum development.

This does not mean that Andalusia alone can produce sufficient sugar to supply the consumption, and it is from Cuba and Porto Rico almost exclusively that Spain is obtaining at present what sugar she requires to import.

Formerly, and even quite recently, she bought these from France, later in Germany, and the excessive quantity imported from Germany contributed considerably to the adoption by the Spanish Government of measures, in 1884, for the protection of her own industry.

The import duty of sugar from the Antilles was abolished in October, 1884, and since then transatlantic sugars only pay the octroi, which is frs. 17.60 (13/9), and for the metropolis only frs. 8.50 (6/8). The result is that the imports from Cuba and Porto Rico are continually increasing, other foreign importations becoming almost nil. A new industry is being created in Andalusia, the refining of colonial sugar, by which the works which produced nothing for nine months are being utilized again, thanks to Marquis de Larios.

The Cuban and Porto Rico sugars are imported only in Spanish vessels, as considerable surtaxes are levied on those imported in foreign bottoms.

IMPORTS INTO SPAIN FROM 1850 TO 1884.

Years.	Cuba and Porto Rico. Tons.	Philippines. Tons.	Other Countries. Tons.	Total. Tons.
1850-54	28,159	765	4	28,928
1855-59	35,231	1,171	73	37,175
1860-64	38,630	1,040	198	39,869
1865-69	33,410	552	203	34,156
1870-74	33,700	1,450	3,148	38,268
1874-79	22,475	1,695	8,770	32,940
1880	18,489	3,046	6,940	28,475
1881	15,109	8,250	10,570	33,919
1882	18,049	4,275	12,725	35,049
1883	25,625		18,899	44,524
1884	25,205		22,143	47,348

THE GIBBS' DRYING MACHINERY.

NOW ADAPTED FOR GRANULATING SUGAR.

The following is a curtailed report of a notice which appeared in the *Times* of Mr. Gibbs' invention:—

“ In this variable climate we cannot depend upon having fair weather for our harvests, and until recently a wet season meant to the farmer a serious loss, with no help for it.

From the fear of this, a relief is afforded by the persevering energy of a private gentleman, who possessed the means of developing his inventions. These means he employed, to the extent of £10,000, in proving that the harvests of the nation could be saved in all weathers. This gentleman is Mr. William A. Gibbs, of Gillwell Park, Chingford, Essex, whose results have been eminently successful, as the wide adoption of his wheat and hay drying machines testifies.

Having succeeded in this problem, Mr. Gibbs turned his attention to other products, such as tea, wheat, sugar, and other produce. In this again he has been abundantly successful, as testimonials from many Millers, Tea Planters and other users testify. But the original machines have lately been further improved upon by their inventor, as a visit to Gillwell Park enabled us to see.

There are other desiccating systems, but the wide difference between those and this consists in the method of applying the heat. In other systems it is applied through plates and pipes and hot surfaces, involving a loss of heating effect. In Mr. Gibbs' system the heat is applied direct from the furnace, filtered from all hurtful accompaniments. At the same time, where delicate substances have to be dealt with, no products of combustion need be used at all.

The first drying apparatus was designed by Mr. Gibbs for the Royal Gunpowder Works at Waltham Abbey. This machine is there used for drying the cotton waste employed in the manufacture of gun-cotton, and at the experiments which were first made in a model machine, General Younghusband, Sir Frederick Abel, and Mr. Anderson, C.E., were present. The experiments were so satisfactory that a large machine was forthwith made and put up at Waltham Abbey. This machine is an iron chamber in which a series of endless bands are adjusted, and the drying is effected by blow-

ing in through the chamber large volumes of either hot or cold air. The system of endless bands and the application of dry air is not new, but what Mr. Gibbs has done is to simplify the system and to render it efficient and economical, and at the same time to increase the power of applying air at various temperatures. The machine thus constructed has been in successful use at the Royal Works for many years, and the method is very suitable for cotton, wool, hair, or other fibrous substances. It is not, however, so applicable to the treatment of wheat, sugar, rice, tea, and similar granular products, because it does not separate and pour the grain through the heated air, nor open up the wet and clotted lumps of tea from the rolling mills. There are, moreover, other advantages in the cylinder system as devised by Mr. Gibbs, to which we shall next refer.

The leading principles which govern this series of inventions are: First, the most thorough separation of the material under treatment, so that each particle receives its due share of the dry air. Second, the application of as much air as can be introduced without blowing the article under treatment out of the machine. Third, the skilful adjustment of the temperature so as to insure the highest drying power without injury to the material.

The tea-drying machine is a long inclined, rotating cylinder, having for its axis a tube for delivering the hot air into the tea. The tube resembles an open telescope, with the rings at the joints left out, so that spaces are formed through which the hot air is blown. Near the head of the cylinder is placed a coke fire, attached to which is a powerful compound wrought-iron fan, specially designed by Mr. Gibbs. This fan is driven by an engine, and draws the heated air from the furnace through a filtering medium, by which it is cleansed from all impurities. The purified air is propelled into the central tube of the drier, where, after doing its work, it passes away into the atmosphere. The wet tea is fed in at the upper end of the cylinder, which is fitted with a series of longitudinal shelves radiating from the central air tube.

The tea in its gradual downward travel from one end of the cylinder to the other is turned slowly over on the three sides of an enclosed triangle, and delivered at the lower end perfectly dry.

Upon the same principle, but differently constructed, is the machine for drying grain, rice, sugar, &c. We inspected several of these

machines at the works. These were 30ft. in length and 3ft. 6in. in diameter. Each end of the cylinder is carried on runner wheels, and the machine is revolved by means of toothed gearing. They are made of galvanized iron plates, and on the interior are a series of cells, and the material to be dried is fed in at the higher end. Running the whole length of the cylinder, but not revolving with it, is the heated air-duct. This is also made of galvanized iron, and resembles the letter D in cross section. On the flat side of the D are louvres, through which the air is blown by a fan and mixed with the grain, the air-duct being placed at such an angle that the grain falls in a continuous stream on to the louvres as it is carried upwards in the cells by the revolution of the cylinder. Travelling gradually down the inclined cylinder, in a spiral course of several hundred feet, the grain at length reaches the lower end, (which is made conical,) and pours out in a steady stream. There are larger machines than these in use, 48ft. long, doing good work in drying brewers' grains, oats for meal, &c.

In all cases the arrangement of furnace and fan is similar to that described by us in connection with the tea-drier, unless any other source of heat presents itself. Mr. Gibbs' fan, which has diagonal blades and is very powerful, will draw heat from a distance of 50 or 100 feet. The cylinders can be used for cooling also, and they are so used at several works, cold air being blown through them.

Such is the latest outcome of Mr. Gibbs' ingenuity. His apparatus is based upon correct scientific principles, and has been carefully thought out in practical construction. The wide range of temperature is one of its most important features. Thus, with delicate crystalline salts, dry, pure air of 70° or 80° can be commanded, and this often suffices to remove the small percentage of superfluous moisture present. On the other hand, with brewers' grains or spent hops 600° or 700° can be used with impunity, and both these extremes, with any intermediate degree required, are perfectly under control. This system of desiccation has a wide application to many manufacturing and industrial processes."

CERTAIN POINTS IN AGRICULTURAL CHEMISTRY, CON-
SIDERED IN REFERENCE TO THE SELECTION AND
APPLICATION OF MANURES FOR THE SUGAR
CANE IN THE ISLAND OF BARBADOS.

*Being a paper read before the Barbados General Agricultural Society,
November, 1886.*

By J. B. HARRISON.

Continued from page 139.

We need not, then, consider the composition of the cane tops, as these would be returned to the land, further than to mention that in the sugar cane, as in all other plants, the constituents of plant food are present, in by far the larger proportion, in the actively growing parts, and therefore by returning the tops to the soil we return a large proportion of the plant food which has been absorbed by the crop. Stripped canes contain an average of 45% of mineral constituents and about 12% of nitrogen; the 25 tons of canes will therefore remove about 50lbs. of potash; phosphoric anhydride, equal to about 38lbs. of calcium phosphate; and about 67lbs. of nitrogen. We must next consider the distribution of these constituents in the course of manufacture. As obtained by our ordinary expression, of from 60 to 65%, about $\frac{1}{3}$ of the nitrogen and of the total mineral constituents is contained in the juice, and $\frac{2}{3}$ remain in the megass. The ash of the juice will contain about 20lbs. of potash and 8lbs. of phosphates; that of the megass 22lbs. of potash and 31lbs. of phosphates. When the megass is burnt the nitrogen contained in it, in round numbers, 44lbs., equal to about 2 cwt. of sulphate of ammonia, is entirely lost. Of the 22lbs. of potash at least 16lbs. combine with silica, &c., to form an insoluble glass, and the 31lbs. of phosphates are brought into a very insoluble state. The whole of the megass ash should be carefully preserved, and spread from time to time upon the pens, where, from the fermentation that is taking place, the potash and phosphates have a chance of becoming more soluble before they are applied to the soil. When the juice is cracked and neutralised by lime, the greater portion of its nitrogenous matter is rendered insoluble; the phosphates are acted upon by the lime, to a great extent thrown down as calcium phosphate, and, together with the former, removed in the skimmings and mud, whilst the potash is

not affected. The mud should be either used as a stock food or applied to the pens, as it possesses a high manurial value.

COMPOSITION OF TWO SAMPLES OF TROPICAL ENSILAGE.

	No. 1.	No. 2.
Water	73·65 ..	78·69
Alcohol	·11 ..	·13
Acetic acid.....	·45 ..	·62
Lactic acid.....	·51 ..	·10
Glucose	1·19 ..	traces
a Albumenoids soluble in water.....	·26 ..	·26
b Insoluble Albumenoids.....	·68 ..	·67
c Amides, gums and extractives.....	2·17 ..	·63
d Ammonia.....	·01 ..	·03
Oil, wax, and chlorophyll	1·63 ..	1·00
Digestible fibre, carbohydrates, &c.	11·90 ..	7·61
Indigestible fibre	5·14 ..	6·86
Soluble inorganic matter	} Ash. { .. .	·84 ..
Insoluble inorganic matter ..		·87
	1·36 ..	2·53
	<hr/> 100·00	<hr/> 100·00
a. Contains Nitrogen	·042 ..	·042
b. ,, ,, 	·109 ..	·108
c. ,, ,, 	·039 ..	·007
d. ,, ,, 	·009 ..	·028

No. 1.—Imphee ensilage. *Thicket Estate.*

No. 2.—Cane top and sour grass ensilage. *Greenland Estate.*

From the foregoing we can estimate our unavoidable loss of available plant food, per acre, caused by the cane crop during its growth: $\frac{3}{4}$ of the potash in the megass ash has become so insoluble as to be practically useless; the phosphates are little better, and certainly will not exert $\frac{1}{4}$ of the manurial action which they previously could do. The loss amounts then to 44lbs. of nitrogen, 44lbs. of potash, and about 25lbs. of phosphates. Of these unavoidable losses a certain proportion of nitrogen is restored to the soil by the rain and dew, which we may estimate at 5lbs. per acre per annum, there is also a certain amount returned, which we cannot at present accurately estimate, by the absorption of ammonia, and probably by the direct assimilation of free nitrogen from the air by the soil; if we estimate the total amount restored during the growth of a cane crop at 10lbs per acre it is probably in excess of the truth.

MEGASS ASH AS TAKEN FROM TAYCHE FURNACES.

	No. 1.	No. 2.	No. 3.
Soluble in hydrochloric acid.....	(27·94%)	(39·89%)	(39·52%)
Iron peroxide	1·01	3·04	·14
Alumina	trace	trace	3·33
Lime	7·81	19·74	19·87
Magnesia	3·39	·29	2·63
<i>a</i> Potash	1·84	2·23	2·43
<i>a</i> Potassium chloride .....	....	....	·67
Sodium chloride	1·29	5·19	....
Soda	1·05	·68	....
Silica.....	....	1·93	·38
Phosphoric anhydride	7·95	2·31	5·95
Sulphuric anhydride	1·18	1·01	·14
Carbonic anhydride	2·42	3·47	4·52
Insoluble in acid.....	(72·06%)	(60·11%)	(60·48%)
Iron peroxide	1·61	....	·01
Alumina	·81	4·37	3·36
Lime	1·96	3·45	1·57
Magnesia	1·02	·15	·31
<i>a</i> Potash	4·81	4·33	4·83
Soda	2·27	4·79	....
Silica.....	57·58	42·67	50·05
Charcoal	2·00	·35	·36
	100·00	100·00	100·00
<i>a</i> Total Potash.....	6·65	6·56	7·68

No. 1, Cottage ; No. 2, Hothersall ; No. 3, Ridge Estates.

MUD FROM CLARIFIERS.

	No. 1.	No. 2.	No. 3.
Moisture	39·64	14·76	56·69
<i>a</i> Organic Matter	49·11	66·93	21·10
Sand and Silica	5·48	3·20	·77
Tricalcium Phosphate	1·19	12·95	3·64
Iron peroxide and Alumina	2·00	·92	·27
Potash.....	·09	·12	·05
Calcium Carbonate, &c.	2·49	1·12	7·48
	100·00	100·00	100·00
<i>a</i> Contains Nitrogen.....	·80	2·07	·36
Equal to Ammonia	·97	2·51	·44

No. 1.—Spring Vale Estate, from top of Clarifiers.

No. 2.—Bentley Estate, from filter press.

No. 3.—Hothersall Estate, from mud press.

SKIMMINGS FROM TAYCHE—VALLEY ESTATE.

Moisture	82·24
<i>a</i> Organic Matter	16·25
Lime	·32
<i>b</i> Phosphoric Anhydride	·52
Sand and Silica	·17
Potash	·17
Iron peroxide and less	·33
	<hr/>
	100·00
<i>a</i> Containing Nitrogen ·075 = to Ammonia .	·09
<i>b</i> Equal to Tricalcium Phosphate	1·13

It is evident, therefore (not taking into account the heavy additional drain caused by our snatch crops of sweet potatoes or yams, a crop of 5 tons per acre of either of which removes in their tubers alone about

The rainfall at Dodd's from June 1st, 1885, to May 31st, 1886, contained an average of

Chlorine	10·054	} Parts per million.
Nitrogen as Ammonia ..	·136	
Nitrogen as Nitrates	·149	

It amounted to 38·67 inches, and supplied 87·96lbs. of chlorine and 2·49lbs. of nitrogen per acre.

The rainfall from June 1st to November 30th, 1886, contained an average of

Chlorine	6·489	} Parts per million.
Nitrogen as Ammonia	·058	
Nitrogen as Nitrates	·214	

It amounted to 66·13 inches, and supplied in six months 103·70lbs. of chlorine and 4·06lbs. of nitrogen per acre.

The rainfall at Dodd's during and immediately after the passing of the hurricane which devastated St. Vincent on August 16th amounted to 9·14 inches, and contained :—

Chlorine	42·52	} Parts per million.
Nitrogen as Ammonia ..	·057	
Nitrogen as Nitrates	·329	

thus supplying ·798lbs. of nitrogen per acre.

J. B. H.

16th December, 1886.

28lbs. of nitrogen, 16lbs. of calcium phosphate, and 40lbs. to 45lbs. of potash, and of Indian, or Guinea corn, of which a crop yielding 20 bushels of corn per acre, or its equivalent in fodder, removes 16lbs. to 20lbs. of nitrogen, 35lbs. of calcium phosphate, and about 30lbs. of potash), that in order to keep up our present state of fertility we must add to the soil during the growth, or immediately before the planting of the canes, manures capable of supplying in a readily available form at least 34lbs. of nitrogen, 44lbs. of potash, and 25lbs. of phosphates per acre. Our only export of plant food from this island of any importance is that of the mineral constituents in sugar and molasses; 25 tons of stripped canes should give us two tons of muscovado sugar, and $\frac{3}{4}$ of a ton of molasses, and calculating from the foregoing figures in each ton of sugar and its molasses exported we lose about 14lbs. of potash, and one to 1½lbs. of phosphates. To check the correctness of these figures, let us attempt to estimate the loss of these constituents occasioned by the sale of sugar and molasses in another way.

Our average export of sugar during the last seven years has been 55,300 hogsheads, which we may say would contain on an average 2,000lbs. of sugar each; our sugar export is therefore about 50,000 tons, and our molasses export probably 21,000 tons. Muscovado sugar contains an average of .85, vacuum pan crystal .23, molasses sugars 1.50, and muscovado molasses 2.00 per cent., respectively, of mineral constituents. From the relative amount of vacuum pan crystals and molasses sugars produced, the ash constituents in the two taken together may, for our present purpose, be considered as equal to those contained in an equal weight of muscovado. The ash of cane sugars contains about 30, and that of molasses 37 per cent. of potash, whilst the phosphates in the ash of each of them is about 4 per cent. We, therefore export, in round numbers, 283 tons of potash and three tons of phosphates annually, equal to 12.66lbs. of potash and 1.38lbs. of phosphates per ton of sugar. If, however, we assume that we reap 40,000 acres of canes yearly our loss calculated in this way amounts to only 15.8lbs. of potash and 1.8lbs. of phosphates per acre; this is of course caused by the facts that our average production of canes does not at present amount to 30 tons per acre, and that we do not extract even 60 per cent. of juice from all of those we do grow. The closely agreeing figures per ton of sugar arrived at in both ways show us clearly that the unavoidable loss of plant food caused to our soils by the cane crop is principally of nitrogen (from the burning of the megass) and potash, whilst that of phosphates is much smaller.

Every planter knows that if he is able to give to his canes a good dressing of pen manure, he will, weather permitting, get a good crop; let us then ascertain how this repairs the loss estimated from the composition of the cane. Good pen manure made under cover (I cannot speak for the washed out compost sometimes dignified by this name), from properly fed animals, contains about 8lbs. of nitrogen and potash respectively, and 14lbs. of phosphates per ton; we at once see that this manure contains nitrogen and potash, in the proportions removed from the soil by the cane crop, and a larger proportion of phosphates. A planter who can obtain a supply of the sheep manure, imported by Mr. T. S. Garraway, is equally well off, and for a similar reason. The average composition of some 65 cargoes imported here during the last six years, and which I have analysed, is nitrogen 1·38, phosphates 2·60 (2·20 of which are "assimable"), and potash 2·15 per cent., or it contains in round numbers 31lbs. of nitrogen, 50lbs. of phosphates, and 48lbs. of potash per ton. Hence we see that the two manures most approved of by the practical planter for early application to his canes are those the composition of which most nearly resembles the drain upon his soil. I must also here call your attention to the fact that both these manures are rich in *potash*.

COMPOSITION OF PEN MANURE.

From Ashbury Estate, October, 1886.

	Open field pen.	Covered pen.
Moisture	49·89 ..	45·64
<i>a</i> Organic Matter	12·17 ..	23·67
Sand and Clay	18·38 ..	15·30
Iron peroxide and Alumina	15·30 ..	12·61
Calcium Carbonate	1·70 ..	1·30
<i>b</i> Phosphoric Anhydride	·14 ..	·29
<i>c</i> Alkaline Salts	2·42 ..	1·19
Magnesia, Soluble Silica, &c. }		
	100·00 ..	100·00
<i>a</i> Contains Nitrogen	·22 ..	·35
Equal to Ammonia	·27 ..	·42
<i>b</i> Equal to Tricalcium Phosphate .	·30 ..	·63
<i>c</i> Contains Potash	·11 ..	·38
Value per ton	\$1·40 ..	\$2·60

Thus far we have confined ourselves to the consideration of the first kind of manuring; we will now discuss the second, that of manuring the plant. The object of this is to supply the plant with, in the most suitable form, the plant food which it requires, at the same time having due regard to the preservation of the store of the plant food in the soil. This we may more properly call feeding the plant. Here we encounter a far more difficult problem than the first; we must address ourselves again to the plant, but in order to get at the correct answer we must do so not on one soil and in one climate, but on many soils and under various climatic conditions, bearing in mind that the plants' requirements may even vary for a single kind of food, according to the form of the manure, the nature of the soil, and the climatic conditions. Have we any exact answer ready to this question in the case of the sugar cane? We have not. Indeed, less appears to be known with regard to the manurial requirements of this plant than those of any other cultivated to anything like the same extent. We are reduced to reasoning from analogy with those of the graminaceæ that are most like the sugar cane in their mode of growth, and composition. We should then expect to find that nitrogen, in a readily available form, exercises a marked influence upon its yield. We find that it does so most strikingly on good soils, not only in Barbados, but wherever the cane is cultivated; and evident that this increase in yield must also cause as it is

COMPOSITION OF 70 TONS OF SHEEP MANURE.

From Venezuela, October 28th, 1886.

Moisture	37·49
<i>a</i> Organic Matter	36·27
Sand and Clay	6·60
<i>b</i> Reverted Phosphates	1·14
Calcium Carbonate	7·00
<i>c</i> Alkaline Salts, &c.	11·50
	<hr/>
	100·00
<i>a</i> Contains Nitrogen	1·80
Equal to Ammonia	2·18
Contains Phosphoric Anhydride	·15
Equal to "Soluble Phosphates	·33
<i>f</i> Assimilable Phosphates	1·47
<i>g</i> Contains Potash	4·10

an increased demand for the mineral constituents of the plant, we must avoid manuring with nitrogenous substances only, and must add mineral constituents to our manures, if by having due regard to the preservation of the store of plant food in the soil we wish to obtain not merely a few large crops, but a long continued succession of large, and also gradually increasing ones. With regard to the proportions in which these mineral constituents should be given to the cane as plant food, and also as to their most suitable form, we find a lamentable absence of data, and must have resource almost entirely to reasoning from analogy. In doing so we must carefully bear in mind that our crop is not a cereal one, and that manures primarily intended, as are the majority of so-called sugar cane manures, for the growth of the wheat crop, and doubtless excellent for such purpose, are not necessarily equally well suited for the growth of the sugar cane. Experiments upon the graminaceæ in the form of the true grasses, say, as upon permanent meadow land, are more suitable for our consideration. At Rothamsted, upon the experimental farm of Sir John Bennet Lawes, during the five years 1876-80, the addition of superphosphate to ammonical manures raised the annual production of hay per acre from $34\frac{1}{4}$ cwt. to $47\frac{3}{4}$ —an increase of 39·4 per cent., and when potash salts, containing 150lbs. of potash per acre, were applied in addition, the yield rose to $73\frac{7}{8}$ cwt.; that is, a total increase of 115·7 per cent., of which no less than 76·3 per cent. is presumably due to this addition; or if we calculate, as resulting from the addition of potash, the increase upon the superphosphate and ammonia manuring, is 54·7 per cent.

Let us compare with these figures the results obtained at the same place with the wheat crop. A manuring with 400lbs. of ammonia salts (equal 80lbs. nitrogen) per acre per annum, produced in round numbers, during a period of 30 years, an average annual yield of $29\frac{3}{4}$ cwt. of corn and straw, the addition of $3\frac{1}{2}$ cwt. of superphosphate raised this average to 38 cwt., an increase of 27·7 per cent., and the addition of 200lbs. of sulphate of potash to the latter gave an average of $42\frac{1}{2}$ cwt. or an increase of only 11·8 per cent. upon its yield, presumably due to the potash. I have taken for consideration these experiments as, having spent some time at Rothamsted studying them, the methods there carried out, and the results obtained, before I came to this island, I am practically acquainted with them, and I think that the results there obtained with

wheat shows us one of the reasons why manure makers object to giving us any, or more than a very small proportion of potash in our sugar cane manures; since reasoning from analogy with wheat they do not consider that the addition of a fair amount of that substance would give an increase sufficient to compensate for its cost, whilst if they reasoned (as I am inclined to believe, more correctly), from analogy with the grasses proper, they would give us a fair amount of it.

We will next consider results, obtained in actual experiments with the sugar cane, as to the importance of potash and phosphates in cane manures. At *Dodds*, as I pointed out to you earlier in the evening, by the addition of 35lbs. of potash to a manuring of nitrate of soda and phosphates, the total yield per acre was increased from 32,026lbs. to 49,116, or 53·36 per cent., a proportion nearly the same as that of the increase obtained by the addition of potash salts to the manures upon the grasses at Rothamsted. Next, let us compare the results obtained on plots 2, 4, 15, 5, and 11 at *Dodds*, last year; upon these the amount of nitrogen applied was very similar, Nos. 4, 5, and 11 received in addition superphosphate, 4 receiving nothing further, No. 15 13½lbs., No. 11 35lbs. of potash per acre in addition, whilst No. 5 received only 35lbs. of potash per acre, but no superphosphate. No. 4 (addition of superphosphate without potash) gave an increase of 3 per cent. upon No. 2; No. 15 of 10·8 per cent.; No. 5 (addition of potash without superphosphate) of 17·6 per cent.; and No. 11 of 25·4 per cent. Apparently here the increase depended more upon the amount of potash added than upon the addition of phosphates, and would, therefore, appear to point to the great importance of the former substance. In December 1883, and April 1884, Mr. Gilzean, of plantation *Anna Regina*, in Demerara, made some elaborate experiments upon commercial sugar cane manures; as he, however, based the rate of his manurings upon the selling price of the various manures in that colony, his results, for our present purpose, are not so valuable as they otherwise would be, not being strictly comparable.

Amongst the manures applied was one known as “Os Ammonite,” manufactured by Messrs. Pickard & Co., of Ipswich, and for the sale of which Messrs. Louis, Son & Co., are agents here. This manure is a mixture of sulphate of ammonia, superphosphate, and potash salts, and contains about 5 per cent. of potash. In December, 1883, in experiments where very heavy dressing of manures were applied, a

plot manured with sperphosphate alone gave 1,500 tons; one with sulphate of ammonia alone, 27·40 tons; one with a mixture of sulphate of ammonia and superphosphate, 26·12 tons; and the one with "Os Ammonite" (containing much less nitrogen than the last-mentioned), 28·75 tons of canes per acre. In the April, 1884, experiments, where much smaller dressings of manure were applied, the yields per acre were 14·54 tons from superphosphates alone, 20·00 tons from sulphate of ammonia alone, 19·09 tons from sulphate of ammonia and superphosphate, and 22·17 tons of canes per acre from the Os Ammonite. These results also point in the same direction as the *Dodds'* ones, and so to even a greater extent do the very largely increased yields obtained in British Burma by the use of potash salts. It is also worthy of note that the manures recommended for the sugar cane by the eminent French authority, M. Ville, are rich in potash (8·00 per cent.) and that in experiments made by M. de Jabrun, in Guadeloupe, quoted by Ville at page 58 of his work on Chemical Manures (first English edition), the manure without potash gave 14 tons, and the complete one (with potash) 23 tons of canes per acre. The results here quoted, and those at page 243 of the same work, with regard to the importance of phosphates and nitrogen, are not altogether in accordance with those I have already considered.

M. de Jabrun found that the manure without phosphates gave 6 tons, with addition of phosphates 23 tons of canes respectively, and in a second experiment the addition of 50 per cent. more superphosphate to the normal manure increased the yield from 18 to 38 tons. The manure without nitrogen gave 22·4 tons, that with nitrogen 23 tons; from which M. Ville concludes that the cane obtains its nitrogen from the air, a conclusion which, as practical planters, I am convinced you will not support, but will rather agree with me that the addition of 2·50 per cent. of nitrogen to a purely mineral manure for the sugar cane is not sufficient to test its importance by. At *Dodds* the addition of superphosphate to the nitrogenous manuring, resulted in one experiment, to a decrease of 6 per cent., and in another to an increase of 3 per cent., and in the Demerara experiments this same addition caused a decrease of about 4 per cent. in 1883 and 5 per cent in 1884; but it must be borne in mind that in both these cases potash was entirely absent. On the other hand, in British Burma where potash was present much greater decreases ensued.

(To be continued.)

GENESIS OF THE ELEMENTS.*

We have received from Mr. W. Crookes, F.R.S., Vice-President of the Chemical Society, a pamphlet entitled "Genesis of the Elements," being a lecture delivered some six weeks ago at the Royal Institution. The subject is not, perhaps, interesting to all our readers, but in view of its high importance to all who occupy themselves with chemical research, and considering the acknowledged talent and great experience of the lecturer, a brief abstract may not be unacceptable.

Mr. Crookes commences by referring to the supposition which, originally dating from Dalton, Sir H. Davy, and Faraday, has of late years been gaining ground, and which bears, in our humble opinion, tokens of the highest probability, that the seventy (or thereabouts) "elements" of the text-books are not irresolvable primordial substances, but "have been evolved from simpler matters; perhaps, indeed, from one sole kind of matter." The lecturer says: "We are seeking now to extend this law (of evolution) to the so-called elements, to the first principles of which stars and organisms alike consist." It is highly satisfactory to find that Mr. Crookes, though he seems to have thought it necessary to make a half apology for raising a question which in the eyes of some might be regarded as heretical, is not merely a speculative theorist, but has himself contributed much laborious work to the elucidation of this problem, and work too which has not been without important results, for it cannot be denied that he has apparently succeeded in establishing that there is a feature of instability in at least one or two of the metallic substances hitherto considered as elementary, which may be regarded as the first step to the resolution of others into more primordial forms. Not that the details of the problem have become simplified; on the contrary, it seems to an outsider to have become more intricate, and clear-headed and patient experimenters have apparently many years of work before them. In the case of the elements yttrium and samarium, which have been the more immediate subjects of Mr. Crookes's investigations, his dictum is that "nothing seems available but straightforward fractionations continued month after month and

* "Genesis of the Elements." By William Crookes, F.R.S., V.P.C.S. A lecture delivered at the Royal Institution on Friday evening, February 18th, 1886. 32 pp London, 1887.

year after year;" and again, he speaks of "long and tedious fractionation," and of having "for many years persistently groped on." The process adopted is shortly described as follows: "It consists in fixing upon some chemical reaction in which there is the most likelihood of a difference in the behaviour of the elements under treatment, even though the difference be slight, and effecting such treatment incompletely, so that only a certain fraction of the total bases present is separated: the object being to get part of the material in an insoluble, and the remainder in a soluble, state. Let us suppose that we have in solution two earths almost identical in their properties, but differing slightly, almost imperceptibly, in basicity. We add to the solution of the earths, which must be very dilute, weak ammonia to such an amount only that it precipitates one-half of the bases present. The dilution must be so great that a considerable time must elapse before the liquid shows a turbidity, and several hours will have to pass over before the action of the ammonia is complete. The liquid is then filtered, by which process we have the earths divided into two parts, no longer identical in their composition. There is now a slight difference in the basic value of the two portions of earths; that in solution being, though by a scarcely perceptible amount, more basic than that which the ammonia has precipitated. This minute difference is made to accumulate systematically until it becomes perceptible either by chemical or physical tests."

The earths are now subjected to the action of the induction spark in a bulb or tube exhausted to a (so-called) vacuum of one millionth of an atmosphere. It had been found that under this treatment certain substances became phosphorescent, or developed different properties from those shown in air of less tenuity, or under the ordinary atmospheric pressure; and the examination of the phosphorescing earths supplies what Mr. Crookes has named "the radiant matter test." After the fractionation had been carried on for some time, it was found that "the phosphorescent spectra of the series of yttrium earths had become modified in the relative intensities of some of their lines," different portions of the fractionated yttria giving different spectra, and these were not mere indications of unstable impurities, which being removed, yttrium (or samarium, as the case might be) would remain in a pure state after their elimination, but the molecule formerly known as yttrium had "*undergone a veritable splitting-up into its constituents.*"

This is the all-important point; in presence of the fact definitely

stated by the Lecturer, we see that the formerly supposed irresolvable molecule of the elementary substance is no longer stable, it is reducible, and to the mind of a clear thinker such a substance must be struck out of the list of fancied chemical elements. But we cannot stop there, but must at once prepare for the possibility (hitherto only a possibility) that the chemical elements are not "the final outcome, the be-all and end-all of chemistry," being changed into a probability, even almost a certainty, and we are thus within measurable distance of the arcanum, the first great stride in the direction of the unknown has been taken. Up to now the process and its attendant phenomena have appeared comparatively simple, but a peculiarity, with which we now become confronted, is, that in spite of the differences between the *phosphorescent spectra* yielded by the different yttria of earths under the "radiant matter test," the *electric spark spectra* of even those most so varying are perfectly identical. Mr. Crookes finds two explanations of this phenomenon, the one which seems to him the more satisfactory consisting in a revision of the theory of the composition of molecules. It may be permitted to tyros like ourselves to suspend our judgment. We seem here in presence of the unknown. Even the Lecturer only ventures to say that "hitherto the molecule has been regarded as an aggregate of two or more atoms, no account being taken of the architectural design on which the atoms have been joined." And when we hear that a distinguished French chemist, "who also has worked on these earths for some time," differs absolutely as to the true nature of these so fractionated compounds, we feel compelled to leave the matter, the utmost that can be regarded as proven being apparently this, that what had been considered as a simple element turns out only doubtfully such. The illustration which Mr. Crookes gives of his hypothesis respecting the arrangement of atoms in a molecule is very ingenious, and deserves quotation:—"Let us imagine yttrium to be represented by a five-shilling piece. By chemical fractionation I have divided it into five separate shillings, and find these shillings are not counterparts, but, like the carbon atoms in the benzol ring, have the impress of their position, 1, 2, 3, 4, 5, stamped on them. These are the analogues of my $G\alpha$, $G\beta$, &c. If I now bring in a much more powerful and searching agent—if I throw my shillings into the melting pot, or dissolve them chemically—the Mint stamp disappears, and they all turn out to be silver. I submit my yttrium, or my $G\alpha$, $G\beta$, &c., to the intense heat of the electric spark, the little differences of molecular arrangement vanish,

and the atoms of which the molecules of yttrium, $G\alpha$ and $G\beta$ are alike composed, reveal their presence in identical spectra."

It seems that Professor Nordenskjöld is also working in the same direction, and has obtained some striking results. We regret that want of space, and the fear of rendering ourselves tedious to all but adepts in chemical science, prevent us from going further into detail. We must close this insufficient notice of a deeply instructive lecture by another quotation, premising that Mr. Crookes, after venturing "provisionally to conclude that our so-called elements or simple bodies are, in reality, compound molecules," proceeds to justify the title of his lecture by a bold hypothesis as to how these so-called chemical elements may have been generated. He says:—

"To form a conception of their genesis, I must beg you to carry your thoughts back to the time when the visible universe was 'without form and void,' and to watch the development of matter in the states known to us from an antecedent something. What existed anterior to our elements, before matter as we now have it, I propose to name *protyle*."

(We venture to suggest that the word which Mr. Crookes "coins"—though it appears, from his own foot-note, to have been used by Aristotle in an uncombined form, viz., $\pi\rho\acute{\omega}\tau\eta\ \upsilon\lambda\eta$ —would be more accurately written "prothyle.")

"I will ask you to accompany me to the very beginning of time, before even the chemical atoms had consolidated from the original *protyle*. . . . We have then to seek how protyle was converted, not into one only kind of matter, but into many. If we recognise that it contained within itself the potentiality of all atomic weights, how did these potentialities become actual? We may here call to mind the suggestion of Dr. E. J. Mills, that our elements are the result of successive polymerisations during the cooling process. We shall also derive much assistance from a method of illustrating the periodic law, proposed by my friend Professor Emerson Reynolds, of the University of Dublin." Here follows a diagram, which we are told is Professor Reynolds's, slightly modified, and which we are sorry to be unable to reproduce, as it makes abundantly clear the main points of the lecturer's theory. Adopting an idea analogous to the swing of a pendulum, gradually declining in amplitude according to a mathematical law, the chemical elements are arranged along the lines according to their atomic weights, and it is remarkable how accurately the series of like bodies fits into the scheme, and how most of the normal or abnormal phenomena belonging to each are explained and

interconnected, and how the progressive development becomes logical and consequent. Mr. Crookes says :—"Let us pause and examine the results. We have now formed the elements of water, of air, of ammonia, of carbonic acid, of plant and of animal life; we have phosphorus for the brain, salt for the sea, clay and sand for the solid earth; two alkalies, an alkaline earth, along with their carbonates, borates, nitrates, fluorides, chlorides, sulphates, phosphates, and silicates, sufficient, it may be said, for animal and vegetable life, and for a world not so very different from that in which we live and move. . . . The symmetry of nearly all this series proclaims at once that we are working in a right direction, . . . and the more I ponder over the arrangement of this zigzag curve, the more I become convinced that he who fully grasps its meaning, holds the key to unlock some of the deepest mysteries of creation." The lecturer goes on to develop his theory, and deal with possible difficulties in a most interesting manner, and closes :—"I submit that I have at least shown the improbability of the persistence of the ultimate character, and the eternal self-existence, the fortuitous origin, and the simultaneous creation of the elements. The analogy of these elements with the organic radicles, and still more with living organisms, constrains us to suspect that they are compound bodies, springing from a process of evolution. We have drawn corroborative evidence from the distribution and the association of the rare earths, evidence which seems to be converging to the point of assuming a direct character. Led by the great law of continuity, I have ventured to suggest a process by which our elements may have, I do not say *must* have, been originated, for no one can be better aware than I am how much remains to be done before this great, this fundamental question can be finally solved. I earnestly hope others will take up the task, and that chemistry, like biology, may find its Darwin. If we consider the position we occupy with reference to the primary questions of chemistry, we may compare research to a game of chess. The investigator is playing with Nature for knowledge and power. The game is fearfully unequal. We know nothing but what we have learned in countless losing games. But our knowledge is increasing. Suppose we one day win the game; we shall then know, *a priori*, what we now have to find out by special experiment; we shall foresee the results of every conceivable reaction, and our theories will legitimate themselves by the power of prediction. To attain such knowledge seems to me the grand task of the chemistry of the coming age."

THE BRITISH AND COLONIAL ANTI-BOUNTY
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Offices :—51, LIME STREET, LONDON, E.C.

This Association has been formed in order to arouse public attention to the injury inflicted upon British and Colonial interests, and upon the working classes, by the system which prevails in many foreign countries of granting bounties, thereby giving the industries of those countries an artificial advantage in British markets—to prove that such bounties are destructive of free trade within the Empire—and either to bring about their abolition, or to neutralize their pernicious effect.

The Continental system of granting bounties on sugar has been continuously extended, and the injury caused to British interests has consequently increased year by year. Recently the system has been applied to other interests, and it is evident that no industries similarly attacked can in the long run successfully withstand a competition subsidized by the unlimited resources of European Governments.

The influence which the bounty system exercises in disturbing the natural course of industry throughout the world has been clearly proved in the case of sugar. Notwithstanding the magnitude of the

sugar industry, and the fact that sugar is produced by a larger number of countries in the Eastern and Western Hemispheres than probably any other commodity, while also its production can and would be indefinitely extended if left to the natural influence of demand and supply, it is a remarkable fact that the world now depends for one-half of its sugar upon the subsidised and inferior article.

This Association therefore calls upon those who believe in the essential doctrines of free trade, and all others, especially those who are interested in maintaining legitimate means of employment for our working classes, to assist in removing that which is "an undoubted outrage on economic laws," and in restoring, so far as British markets are concerned, free trade in sugar.

The Association consists of gentlemen interested in the sugar industries of India, Mauritius, Queensland, New South Wales, Fiji, Natal, the West Indies and British Guiana, the sugar refiners of the United Kingdom, engineers, and others injuriously affected by the bounty system.

Subscriptions of any amount will be received. They may be paid to the Secretary, at 51, Lime Street, London, or sent direct to the Bankers, Messrs. Robarts, Lubbock & Co., 15, Lombard Street, London.

51, Lime Street, London, E.C., March, 1887.

In addition to the foregoing circular, the Association have issued the following, on

FOREIGN BOUNTIES ON SUGAR.

The foreign bounties on the exportation of sugar have caused much loss, injury and suffering to the sugar producing Colonies of the Empire, and to important home industries. They have enabled an artificial bounty-fed foreign industry to dominate free British markets, and have thus produced distrust and prevented capital from finding its way to places where it is well known that sugar can be most cheaply produced. They constitute an attack by foreign Powers on British capital and labour, by which natural sources of production are injured and restricted, and British producers denied free competition, even in their own markets. Acquiescence in this attack is inconsistent with our commercial policy, which demands free competition on British markets for all producers, British and foreign, by which alone the permanent interests of the consumer can be secured.

Liberal and Conservative Governments have vied with each other in their efforts to obtain the abolition of these bounties, and they would undoubtedly have been successful in obtaining an International Convention if they had consented to a penal clause, similar to that which had been accepted, without question, in the Convention entered into by Great Britain, France, Holland, and Belgium, in 1864. Thus the question of a duty to countervail a bounty was raised, and those who have thought it out are convinced that the principle is a sound one, in which opinion they are supported by very competent authorities. The Home and Colonial Sugar Trade do not believe that the actual imposition of a countervailing duty is essential to remove bounties, because they believe that statutory power to impose such a duty, coupled with judicious negotiations on that basis, would result in their abolition. But even if it were necessary, it is clear that a duty to intercept the bounty would restore free competition by removing the bounty from the market and securing it for the revenue, and would therefore be a tax on bounties, not on sugar, inasmuch as all sugar not bounty-aided, whether British or foreign, would be imported duty free. The operation of such a duty would leave the price of sugar exactly what it would be were there no bounty and no duty, and would therefore immediately attain the end which long-continued negotiations have sought but failed to secure. The result therefore would be the same, as regards the consumer, whether the bounty were countervailed by duty or abolished by treaty; but if countervailed, the bounty, instead of being lost, would be accepted for the revenue to the relief of taxation. The object is solely to obtain freedom of competition for all the world in British markets, and is, therefore, in no way concerned with the foreign protective tariffs which hinder or prohibit our exports to foreign markets. Hence no question of reciprocity or retaliation can possibly be involved.

The Association does not advocate any fiscal measures tending to raise prices above natural prices, operating exceptionally in favour of our national industries and trade, intercepting any natural advantages possessed by the subjects of other States, or having any effect on prices other than the absence or abolition of foreign bounties would have.

*British and Colonial Anti-Bounty Association,
51, Lime Street, London.*

THE COLONIAL CONFERENCE.

The conference of delegates and representatives from the principal colonies will assemble on Monday, the 4th of April, at eleven o'clock, under the presidency of Sir Henry Holland, M.P., Secretary of State for the Colonies. The first meeting will take place in the Conference-room at the Foreign Office, when the Prime Minister and other members of the Government will be present, and a certain number of peers, members of Parliament, and other gentlemen of distinction connected with the Colonies will also be invited. The subsequent meetings of the conference will be held at the Colonial Office, and will be conducted in private.

The names of the delegates expected to be present are as follow:—
CANADA.—Sir A. Campbell.

VICTORIA.—Sir Graham Berry (Agent-General), the Hon. A. Deakin (Chief Secretary), the Hon. J. Lorrimer (Minister of Colonial Defence), and the Hon. J. Service (late Premier).

NEW SOUTH WALES.—Sir Saul Samuel (Agent-General), Sir P. Jennings (late Premier), and the Hon. R. Wisdom.

SOUTH AUSTRALIA.—The Hon. J. W. Downen (Premier) and Sir Arthur Blyth (Agent-General).

QUEENSLAND.—Sir Samuel Griffith (Premier) and Sir James Garrick (Agent-General).

WESTERN AUSTRALIA.—The Hon. John Forrest (Commissioner of Crown Lands) and Mr. Septimus Burt.

TASMANIA.—The Hon. John Stockell Dodds (Attorney-General) and Mr. Adye Douglas (Agent-General).

NEW ZEALAND.—Sir W. Fitzherbert (Speaker of Legislative Council) and Sir F. Dillon Bell (Agent-General).

NEWFOUNDLAND.—The Hon. R. Thorburn (Premier) and Sir Ambrose Shea.

CAPE OF GOOD HOPE.—The Hon. T. Upington (Attorney-General) and the Hon. J. Kofmeyer.

NATAL.—Sir Charles Mills (Agent-General) and Mr. J. Robinson.

The Governments of the Colonies not possessing responsible government will not be officially represented at the conference, but the Secretary of State will invite gentlemen specially conversant with the affairs of any such colony to attend at the opening meeting and also during the subsequent discussion of any particular subject should it be thought that their local knowledge would be useful.

Should the Secretary of State be unable to be present at any meeting of the conference, his place will be taken by the Earl of Onslow, the Parliamentary Under Secretary of State.

The conference will sit from the 4th of April to the 7th inclusive, and will then adjourn, probably until the 15th.

Mr. W. A. Baillie Hamilton, private secretary to Sir Henry Holland, has been appointed to act as secretary to the conference, and all communications on the subject should be addressed to him, at the Colonial Office, Downing-street.

Sir H. Holland in answer to a question in the House of Commons on the 25th March, upon the subject of "The Colonial Conference," stated that secrecy must continue "to be observed with regard to many of the defensive measures" the consideration of which is one of the principal objects of the meeting of the Colonial representatives in this country. Also that it is not desirable that proposal and tenders for mail services, and telegraphic communications, and the discussion of them should be prematurely made public. It is proposed to furnish the papers with a *précis* of the proceedings each day.

The Prime Minister and other members of the Government will be present at the opening; and members of the Government will attend when the Conference have under discussion matters affecting their departments.

THE COLONIAL SUGAR REFINING CO., NAUSORI, FIJI.

On the banks of the Rewa, the noblest river among the Fiji Islands, is situated the "Big Mill" of the Colonial Sugar Refining Company at Nausori. This sugar mill is said to be the largest in the world, having a capacity of twenty tons of sugar per diem, to obtain which it is necessary to crush, on an average, no less than 300 tons of cane. Many hundreds of acres of land belonging to the company are here under cane, and much more is brought from other plantations of the company, or from those of other proprietors who grow cane for this mill, receiving for it 12s. 6d. per ton delivered. The number of labourers employed on this estate is large, the majority of them being Indian Coolies, though many Polynesians and Fijians are also employed. The coolie is not found to be so useful as either the other class of labour, but the repressive legislation of the Crown Colony Government existing at Melbourne to a great extent prevents the employment of the native Fijians, and the restrictions placed

upon the employment of Polynesians, with the expense of introducing them under the present regulations, are almost prohibitory.

The buildings on this extensive estate form quite a town in themselves. The residence of the manager is pleasantly situated on a knoll in the centre of the plantation, and those of the overseers are a series of neat cottages on the banks of the river. In a central position are the large iron buildings containing the ponderous machinery, boilers, sugar stores, &c., and on the other side of these are the coolie lines and dwellings of the Fijian and Polynesian labourers, while several other cottages compose the residences of the mechanics and other European employes. Moored in the river in the front of the mill are the company's fleet of iron punts and steam launches, some of the former being of very large size, capable of carrying some 200 tons of sugar-cane each on a very light draught of water. Away on another branch of the Rewa, on the island of Tonga, and not far from Wai Tovv Tovv, is the estate of Koronwia, the property of the Rewa Sugar Company of Melbourne, of which Mr. W. Mune is manager. A large quantity of land (some 900 acres) is here under cane, extensive crushing machinery has been erected, and the result is most satisfactory.

In consequence of the great depression in the price of sugar, through the severe competition of the bounty-fed beet sugar of Europe, the whole of the working expenses of this, as well as of other mills, have been cut down to the very lowest point. The staff of Europeans is small, and is confined to overseers, engineers, and a few other mechanics. All the work about the mill is performed by coolies. Upon the river Waimuna there are two or three plantations, all engaged in growing cane for the "Big Mill," and above the junction each bank of the Rewa is studded with numerous plantations, most of which are devoted to cane growing. A few miles above the Waimuna is Madwrotolo, where there are also the plantations of Koro Gaga, Navuso, and Na Kandi, all the properties of the Colonial Sugar Refining Company, the cane from which is taken down the river to Nausori for crushing. Above is Ulicalia, the estate where the Rewa Sugar Company first commenced their operations. The mill has now been dismantled, and the cane is taken down to Koronwia. On the other side of the river are the plantations known as Toli and Lau Lau, and opposite these again is another extensive plantation of the Colonial Sugar Refining Company, Naitisiri, where a large area is under cultivation. Baulevu, Viti, and Munikabu are

close by, and the two last-mentioned estates are worked most systematically, their proprietors being practical agriculturists, and on these the heaviest crops of cane sugar grown on the river have been obtained. After passing Vissibi, the highest plantation on the river, that of Viria, the property of the Colonial Sugar Refining Company, is reached. Here the company has some 700 acres, about half of which is under cane. On this and the neighbouring plantations the cane is conveyed to the mill which has been erected here principally by railway, as the river is too shallow just below this point for navigation by loaded punts during the dry season.

The Fijians, under Government auspices, plant sugar-cane in payment of a tax in kind, and the plantations on which this is done are under the inspection of a Government overseer. This cane is paid for at the mill at the same rate as the Europeans receive for theirs, viz., 12s. 6d. per ton.(?) The soil in the delta of the Rewa is exceedingly rich, but being very low-lying, and subject to occasional floods during the rainy season, is very marshy in places. There is little doubt, however, that with systematic trenching and drainage it could be successfully cultivated, for the periodical floods fertilise the soil by depositing upon it a rich layer of vegetable *debris* washed from the surface soil of the hills on the upper river, where the heaviest rains occur. The Rewa country is but little affected by the occasional hurricanes which visit other parts of the group. During that of March last no harm was done, except the laying flat of the cane most exposed to its fury, and from this the crops of Viti and Munikabu suffered the greatest damage. This, however, could be obviated by deeper planting, a course which is strongly advocated by some experienced sugar planters from the West Indies, but it does not seem to find favour in the Fiji Islands.

Altogether there are somewhere between 5000 and 6000 acres of land under sugar cane on the Rewa River, and there are many thousands of acres yet available for planting, but this is hardly likely to be taken up while the industry labours under the disadvantages it does at present, the ridiculously high price of labour, the competition of beet sugar, and the heavy import dues which are imposed by the Australian colonies. Should, however, intelligent legislation reduce the price of labour, or a European war remove the competition of beet sugar, and the efforts now being made to bring about reciprocity with Victoria be crowned with success, the prospects for planters

would instantly improve. When the markets of the colony, which consume the whole of the crop, are opened free to the Fijian staple product, we may expect the cultivation and manufacture of sugar over the whole island to be undertaken on a far more extended scale, with benefit to the country generally, and profit to those who may be induced to embark in the enterprise.—*The Grocer*.*

ABSURDITY OF THE SCHEDULE OF EXPORT DUTIES ON SUGARS AND MOLASSES IN CUBA.

The ruling schedule for collecting the export duties on sugars and molasses in the island of Cuba was enforced on the 23rd August, 1886, and, on perusal, the reader can easily detect the absurd basis, or principle, taken for its formation. It is controlled in the following few lines:—

Sugars: Dry, centrifugals, and refined sugars, \$0 40c. per 100 kilos., regardless of package. Muscovados and concentrated \$0 35c. per 100 kilos., regardless of package.

Molasses: 13 cents per 100 kilos.

Payable in gold coin less 25 per cent.

The reader, if an expert in the different classes and qualities of sugars manufactured in Cuba, must find himself amazed with the above schedule.

The Cuban planter making “Derosne” “Relieux” triple effect white sugars, “clayed,” “Coguchos,” “centrifugals,” or “clarified,” and “centrifugal molasses sugar,” all pay the same rate of export duty, regardless of package, colour, class or quality. With “Muscovados” or “open kettle” sugars, with “concentrated” and molasses happens the same thing. We are sorry to deduce from the above facts, that the Spanish Minister of the Colonies and the Minister of Finance, or Treasurer, know very little about sugars, or about the Laws of Political Economy. By the above we cannot even dare to detect if they are “Protectionists” or “Free Traders.”

At any rate, at a glance it is easily seen that the export duties in Cuba are comparatively light, much to the benefit of the discouraged planters of the day.

THE *STATIST* ON THE SUGAR BOUNTIES.

In opposing the system of bounties (so oppressive to both classes) our sugar refiners and West Indian planters have hitherto worked on different lines. The refiners* desired that all *raw* sugar (whether bounty fed or not) might continue to be admitted free, but that a moderate duty, say about 3s. per cwt., should be put on the importation of all refined sugar, classing as *refined* all sugars above 18 Dutch standard. The West Indian, on the other hand, only seeks for a countervailing duty against bounty-fed beet sugar, and would leave the importation of all other sugar free. The system, however, now adopted on the Continent of sending here chiefly white crystallised beet sugars has had such a serious effect on our refiners' trade that they have decided to coalesce with the Colonies in the effort to induce the Government to impose a countervailing duty on beet sugar. In the committee just formed for this purpose assistance is being sought from engineers and others whose interests are also gravely touched by the transference of such an important industry, with its auxiliary trades, from the United Kingdom and the Colonies. For wherever sugar is produced or worked up there will be employment for machinists, bagging makers, &c., as well as for the labour directly engaged in making and cultivating sugar. Our shipping, insurance, and banking interests would also suffer. And it is further urged that a continuance of the present disastrous state of the sugar trade will probably lead to very grave social, financial, and political troubles in our Colonies, which would seriously try their loyalty. With, too, the cane sugar industries once extinguished, the beet growers would not be slow in returning to a higher range of prices. So the present advantage to the consumer could not be expected to last. These are some of the arguments we hear advanced in support of the countervailing duty. The supporters, however, of these arguments must remember that though our refiners and colonists suffer, there are many trades here which are being largely benefited and developed by the low price of sugar, while there can be no question that the public at large gain greatly and directly by obtaining sugar, jam, &c., at the present very low rates. It is remarked, too, that some trades hitherto considered peculiar to France are now being transferred here,

* The writer is under a misapprehension. Our West Indian planters as well as our refiners would countervail *all* bounty fed sugars, whether raw or refined.—ED. S. C.

where sugar sells for about one-third of what is paid there. The effect here, therefore, on trade is something like a repetition of the revocation of the Edict of Nantes. Such, then, is one happy effect of our neighbours' *œconomice politicæ inscientia*. And it is satisfactory to feel that these new industries and developments, once firmly established here, will not be easily removed, even should our Continental neighbours hereafter become wiser on the bounty and duty question, and realise the truth of the remark that "A statesman may do much for commerce, most by leaving it alone. A river never flows so smoothly as when it follows its own course, without either aid or check."

While, however, fully alive to the many and important advantages which the unwisdom of Continental nations confers upon us, it is impossible not to feel great sympathy with those both here and in the Colonies, whose old industries are suffering, not from natural decay, but through the subsidised competition of rivals. There are good grounds, however, for believing that the force of this unequal rivalry is about to be materially lessened. In the United States a reduction of one-third in the supposed bounty of 3s. per cwt. took place last year, and it is rumoured that a further reduction will be shortly made. Of the chief supporters of the bounty system in Europe, Russia may now be considered to have withdrawn,* after a short and painful experience of the bounty on her finances, the desperate condition of which we lately pointed out. In Austria, the charge on the Treasury has also been found too severe, and such a limitation in the bounty is likely to be made as will very materially reduce the future sugar exports from that country. From Germany we have also intimation of a probable reduction of the bounty, the present system telling too seriously on her finances. Last year the German revenue from sugar was reduced to £1,100,000, against £2,200,000 in the previous year, and this season the reduction is expected to be still greater, as with a larger crop and a greater proportion of crystallised sugar exported, the bounty will be considerably larger even after allowing for an increased home consumption. In France some diminution of the present absurd bounty is sure to be made, though not sufficient, it is thought, to prevent a further increase this year in the cultivation of beet. The increased protection just granted to wheat may, however, somewhat tend to check this. The sugar interest in France is rich and powerful, the two leading refiners there

* We fear, however, only for a time.—ED. S. C.

being reported to clear about £450,000 *each* per annum, *in addition to the ordinary trade profit*. They are well able, therefore, with the agricultural interest, to secure very full representation, both in the press and with politicians. The national hatred against Germany also very materially assists the French sugar rivalry with that country.

In considering the future of these bounty-fed industries, it is impossible not to be struck by the very insecure basis on which they rest. With the enormous military expenditure going on in all these Continental countries, and the consequent financial embarrassment, it is impossible for these heavy bounties to be much longer maintained, while the depreciation they have led to in sugar is causing both fiscal and scientific changes to be made in cane sugar countries, such as will make the competition with beet much more keen, just when the bounties are removed. It would be bold, too, to assert that such a change might not occur here in public feeling as might allow some counter-vailing duty to be established; for the decisions of a democracy are uncertain. In what were considered the firmest strongholds of free trade we see some strange waverings. In the beginning of this century our Parliament was under the control of the landed interest, who, assisted by the fear of being dependent on foreigners for our corn supply, maintained the corn duties. Then, with power centred in the middle and trading classes, we saw the establishment of free trade. Now we have become subject to an almost pure democracy, and what some great intellects fear from their government is seen by the following extract from Mr. Lowe's celebrated speech in 1866:—
“Look at free trade. If we have a precious jewel in the world, it is our free trade policy. It has been everything to us. With what eyes do democracies look at it? Let us turn to history, and not enter into particular cases of particular working men. Take the facts. Canada has raised her duties enormously, and adjusted them upon protectionist principles. The Ministry in Victoria were freetraders, but by the will of the people they have been converted, and have become protectionists. So vigorously has the question been fought that destruction was threatened to the second branch of the Council, though equal in power to the other, in defiance of the laws of the country, and all to carry out a policy of protection. Then we come to America. America out-protects protection—there never was anything like the zeal for protection in America.”

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
 Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; 6,
 Bank Street, Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

165. C. D. ABEL, London. *Method of extracting foreign substances in particular raffinose from sugar solutions by means of lead, either in the form of oxide or as electrode.* (Communicated by Messrs. Pfeifer & Langen, Germany.) 5th January, 1887.

602. R. A. ROBERTSON and J. G. HUDSON, Glasgow. *Improvements in sugar cane mills.* 14th January, 1887.

1931. M. A. PERRET, London. *Improvements in apparatus for extracting the saccharine or other matter from sugar cane and other substances.* (Complete specification.) 7th February, 1887.

2297-2298. A. BRIN and L. Q. BRIN, London. *Improvements in the treatment of saccharine and sacchariferous matters for the purpose of decolouring, purifying, or refining them.* 14th February, 1887.

2572. CHARLES D. ABEL, London. (Communicated by Theophile Rousselot, the Antilles.) *Improvements in multiple three roll sugar cane mills.* 18th February, 1887.

2905. H. H. LAKE, London. (Communicated by La Campagnie de Fives, Lille, France.) *Improvements relating to diffusing apparatus for use in the treatment of beetroot sugar cane and other substances.* 24th February, 1887.

3526. ALFRED E. MAJOR, Wandsworth. *Improvements in the manufacture of sugar.* 8th March, 1887.

AMERICAN.

ABRIDGMENT.

355138. W. and C. L. CAIRNS, Jersey City, New Jersey. *Centrifugal extractor.* 28th December, 1886. The inventor, to strengthen the perforated basket, winds round it at intervals a band of wire, and solders the ends thereof.

GERMAN.

ABRIDGMENTS.

353092. C. STEFFEN, Vienna. *Refining raw coloured sugar.* 23rd November, 1886. A number of vessels connected by pipes in series are filled with raw sugar, and pure saccharine liquor passed through methodically. The pure sugar takes the place of the molasses, which escapes at the last vessel. When the first in the series is purified sufficiently it is detached, emptied, filled with raw sugar, and placed last in the series, and so on.

31353. C. HANSLIN and G. GUTSCHE, Breslau. *An improved evaporating apparatus for continuous operation.* 10th August, 1884. The heating portion of the cylindrical apparatus, which is connected with an air pump, consists of annular pipes laid one over the other. The pipes are connected to one another by means of two screws, and have alternately-placed openings arranged so that the steam must take a regular backwards and forwards direction in its passage through them. The syrup which is to be evaporated trickles continuously out of an annular feed-channel down over both sides of the large evaporating space formed by the circular pipes, and is by this means rapidly concentrated.

31245. W. YARZYMOWSKI, Bogatoje, Russia. *Apparatus for evaporating saccharine solutions by means of furnace gases.* 5th August, 1884. The apparatus is fixed between the flues of a steam boiler and the chimney, upon a bridge over a side flue. It consists of a box-shaped apparatus for the juice, provided with a receiver for the same. The lower part of the apparatus is filled with tubes for the passage of the heated gases, and has smoke chambers closed with doors on each side of it. These chambers are connected with the side flue below, and are provided with dampers for cutting off communication with the same when necessary. The open part of the grid underneath the bridge can also be provided with a damper for the same purpose, so that the fire gases can pass either direct to the chimney or through the evaporating apparatus.

31046. JOSEF KASALOVSKY, Prague. *Improvements in evaporating and heating apparatus.* 26th February, 1884. The evaporating apparatuses are provided with Field's pipes (pipes closed at one end, and containing an inner circulation tube), which project downwards from the syrup reservoir into the steam chamber. This latter is connected with the juice receptacle by means of pipes and a valve, in

order that the air and ammonia in the steam may, from time to time, be discharged. In order to further the circulation of the juice, circulating pipes or rods are also fixed in the vertical heating pipes of the heating apparatus. Little plates are fixed in the upper ends of the pipes, in order that the direction of the flow of juice may be changed on its discharge from the pipes.

37886. L. MAY, Moravia. *Apparatus for discharging sugar from the metal division pieces used in sugar shapes.* 17th July, 1885. The division pieces, consisting of narrow parallel strips of sheet metal fastened together by metal bands, and laid for the purpose of removing from them the sugar whirled or washed into them upon a piece of sheet metal, bent to the shape of a half circle, and are fastened to the same by suitable catches, so that the strips forming the division pieces separate radially, and the sugar is detached from their sides. The plate, and with it the stamp, is then raised by aid of an eccentric, and the whole of the sugar bars are simultaneously thrust out from the metal division strips, and then pushed, by aid of the movable rakes, to one side.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, March 17th, 1887.

FAIR REFINING.	96c/o CENTS.	GRAN- ULATED.	STAND. A.	STOCK IN FOUR PORTS.
Mar. 17, 1887.—4 9-16c.	5½c.	5 11-16-¾c	5 5-16-¾c.	Jan. 1, 1887—102,279 tons.
Mar. 18, 1886.—4 15-16c.	5 9-16c.	6¼c.	6 13-16c.	Jan. 1, 1886— 57,328 tons.
Mar. 19, 1885.—4 11-16c.	5 5-16c.	6 1-16c.	5¾c.	Jan. 1, 1885— 89,186 tons.
Mar. 20, 1884.—5 9-16c.	6 7-16c.	7 5-16c.	6 13-16c.	Jan. 1, 1884— 60,900 tons.
Mar. 22, 1883.—7 1-16c.	7 13-16c.	8¾c.	8½c.	Jan. 1, 1883— 50,297 tons.
Mar. 23, 1882.—7½c.	7 15-16c.	9¾c.	9¼c.	Jan. 1, 1882— 43,927 tons.
Mar. 21, 1881.—7 3-16c.	8 3-32c.	9¼c.	8½-¾c.	Jan. 1, 1881— 66,993 tons.
Mar. 18, 1880.—7¾c.	8 21-32c.	9½c.	9¼-½c.	Jan. 1, 1880— 63,558 tons.
Mar. 20, 1879.—6¼c.	7 3-16c.	8¼c.	8-8½c.	Jan. 1, 1879— 50,773 tons.
Mar. 21, 1878.—7¾c.	8½c.	9¼c.	8½-9c.	Jan. 1, 1878— 48,230 tons.
Mar. 22, 1877.—8¾c.	9¾c.	11½c.	10½-¾c.	Jan. 1, 1877— 25,885 tons.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO FEBRUARY 28TH, 1886 AND 1887.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1886.	1887.	1886.	1887.
	Cwts.	Cwts.	£	£
Germany	624,652	962,812	464,180	521,213
Holland	48,623	40,740	37,061	21,825
Belgium	183,469	241,154	129,181	123,126
France	24	1,534	42	900
British West Indies & Guiana	421,617	511,367	382,195	388,104
British East Indies	97,181	10,000	55,940	4,380
China and Hong Kong	24,744	12	13,282	6
Mauritius	16,801	18,611	10,937	8,387
Spanish West India Islands	—	—	—	—
Brazil	224,780	134,659	158,428	71,838
Java	909,854	612,603	767,190	410,004
Philippine Islands	90,661	42,202	55,455	18,066
Peru	156,452	63,273	122,798	39,278
Other Countries	146,001	97,069	111,832	53,875
Total of Raw Sugars ..	2,944,859	2,736,036	2,308,521	1,661,002
Molasses	17,277	19,881	7,162	5,913
Total Raw Sugars			2,315,683	1,666,915
REFINED SUGARS.				
Germany	256,146	311,833	229,125	243,112
Holland	144,265	192,204	136,371	151,802
Belgium	14,434	22,644	14,444	18,935
France	96,425	225,528	93,478	168,173
United States	193,093	36,797	179,267	30,216
Other Countries	410,332	—	350,952	—
Total of Refined	1,114,695	789,006	1,003,637	612,238

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	20,741	10,791	15,416	5,825
Belgium	8,840	10,183	6,843	6,411
France	11,424	9,681	8,915	5,834
Portugal, Azores, & Madeira	20,240	13,126	15,380	7,729
Italy	4,724	18,604	3,658	11,141
British North America	397	1,378	361	784
Other Countries	57,629	51,918	47,522	34,203
Total	123,995	115,681	98,095	71,927

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of February compared with the corresponding month of the two preceding years, and the average monthly imports for the past year compared with those of 1883, 1884, and 1885, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"LUMPS AND LOAVES."						"OTHER SORTS." Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			Feb.	Feb.	Feb.	Monthly Average.			Feb.	Feb.	Feb.	Monthly Average.			Feb.	Feb.	Feb.
	1883	1884	1885	1886	1885	1886	1883	1884	1885	1886	1885	1886	1883	1884	1885	1886	1885	1886
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
	1883	1884	1885	1886	1885	1886	1883	1884	1885	1886	1885	1886	1883	1884	1885	1886	1885	1886
France.....	3538	2737	2035	1462	2094	1752	2477	1621	546	2688	824	1514	6015	4358	2581	4150	3518	3266
Holland	2352	3580	4247	3508	4042	2294	1853	1948	1555	1428	1530	1548	4205	5528	5802	4935	5572	3600
Germany & Austria ..	583	552	956	990	669	555	1854	2380	2859	6634	2657	4838	2442	2932	3815	7624	4226	5393
Belgium	319	183	214	344	192	122	124	151	116	113	82	266	443	334	330	457	305	204
United States	226	962	722	854	285	743	294	3386	10654	5078	2881	5330	520	4348	11376	5932	3166	6073
Russia .....	..	..	..	..	..	..	..	..	..	3412	..	10153	..	..	..	3412	10	10153
Other Countries .....	..	..	..	..	8	..	61	121	12	9	2	..	61	121	12	9	..	..
Total	7023	8014	8174	7158	7890	5466	6663	9607	15742	19362	8907	23223	13686	17621	23916	26520	16797	28689
						6457						12424						18881

SUGAR STATISTICS—GREAT BRITAIN.

TO MARCH 26TH, 1887 AND 1886. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1887.	1886.	1887.	1886.	1887.	1886.
London	72	110	76	71	73	90
Liverpool ..	80	106	58	57	61	65
Bristol	2	6	14	14	12	12
Clyde	42	85	49	50	55	68
Total ..	196	307	197	192	201	235
	Decrease..	111	Increase..	5	Decrease..	34

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. FOR FEBRUARY, 1887 AND 1886.

	STOCKS.		DELIVERIES.		IMPORTS.	
	March 1st.		In February.		In February.	
	1887.	1886.	1887.	1886.	1887.	1886.
New York	74	52	55	66	49	84
Boston	13	9	9	13	9	14
Philadelphia	1	..	13	10	13	9
Baltimore . . . . .	..	..	..	..	..	..
Total	88	61	77	89	71	107
	Increase..	27	Decrease ..	12	Decrease ..	36
Total for the Year	—	—	152	154	138	158

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
28TH FEBRUARY, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
194	250	67	373	161	26	1071	1038	1015

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
28TH FEBRUARY, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
1170	485	46	377	184	340	2602	2478	2428

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP,
OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1886-87.	1885-86.	1884-85.	1883-84.
	Tons.	Tons.	Tons.	Tons.
France.....	500,000 ..	298,407 ..	308,410 ..	473,676
German Empire ..	1,012,500 ..	838,131 ..	1,154,817 ..	986,402
Austro-Hungary....	525,000 ..	377,032 ..	557,766 ..	445,954
Russia and Poland ..	475,000 ..	537,860 ..	386,433 ..	307,696
Belgium	95,000 ..	48,421 ..	88,463 ..	106,586
Holland and other Countries.....	50,000 ..	37,500 ..	50,000 ..	40,000
Total.....	2,657,500	2,137,351	2,545,889	2,360,314

These figures are the same as those given last month. Mr. Licht makes no alteration in his present estimate.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

There is a rather firmer tone in the market for raw sugars, which closes with some tendency towards improvement. The prices for beet and cane kinds, as compared with a month ago, are now about 6d. per cwt. higher.

The very large deficiency in the landed stocks in the United Kingdom (110,466 tons) attracts attention, but in view of the large supplies of German beet to come forward, it has not led to any speculative demand.

The prices of German beet 88 $\frac{1}{2}$ % f.o.b. is 11s. to 11s. 1 $\frac{1}{2}$ d. prompt, and 11s. 6d. has been quoted for new crop October-December.

The market for refined sugars has not shared in this slight improvement; where there has been any change it has been downwards. French Loaves are 3d. per cwt. lower.

The imports of refined sugars, of all sorts, for February, as compared with the same month in 1886, show a decrease of 9,808 tons. The imports from Russia in February, 1886, were 10,153 tons, whilst this year there have been none. The imports of American refined, show a falling off of 4,848 tons; but on the other hand the imports from France, Germany, Austria, Holland, and Belgium have increased 5,293 tons.

The deliveries up to 26th March, for the United Kingdom, show an increase of 4,573 tons; whilst the imports have decreased by 33,998 tons.

The stocks in the United Kingdom on 26th March, 1887, were 196,366 tons, against 306,832 tons in 1886.

Present quotations for the standard qualities, as under, are :—

FLOATING.			Last Month.
Porto Rico; fair to good Refining	11/3 to 11/6	against	10/6 to 11/-.
Cuba Centrifugals, 96% polarization	12/6	„	12/6 to 13/-.
Cuba Muscovados, fair to good Refining..	11/3 to 11/6	„	10/6 to 11/-.
Java, No. 14 to 15, good to strong	13/6 to 14/-	„	13/- to 13/6.
LANDED.			Last Month.
Madras Cane Jaggery.. .. .	8/3 to 8/9	against	8/- to 8/9.
Manilla Cebu and Ilo Ilo	8/6 to 8/9	„	8/- to 8/6.
<hr/>			
Paris Leaves, f.o.b.	14/9 to 15/3	„	15/- to 15/6.
Titlers	17/-	„	17/-
Tate's Cubes.. .. .	18/9	„	18/9
Austrian-German Beetroot, 88% f.o.b. ..	11/- to 11/1 $\frac{1}{2}$	„	10/6 to 10/7 $\frac{1}{2}$.

THE SUGAR CANE.

No. 214.

MAY 2, 1887.

VOL. XIX.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

At page 249 will be found the concluding portion of Mr. Harrison's paper on "Certain Points in Agricultural Chemistry," which deals for the most part with the important question of manures. The previous parts of this valuable paper were given at pages 129 (March) and 190 (April).

We have received from a valued correspondent in Cuba, who has had considerable experience in the cultivation and manufacture of sugar, as carried on in that island, a detailed account of "The Average Expenses and Production of a Cuban Central Sugar Factory." We are only able this month to give the introduction, which deals with the methods and expenses in connection with cultivation. (See page 229.)

We understand that there are fair grounds for expecting that an International Conference will be held in London, for the purpose of settling the Sugar Bounty Question. Nothing is yet, so far as our present information goes, definitely settled. But should a conference assemble, we trust that a solution by abolition of all drawbacks, rather than by attempts to correlate drawbacks and duties, will be aimed at. It must be remembered that the Select Committee on the British Sugar Industries in 1880, reported emphatically in favour of refining and manufacturing under excise supervision, as the most effectual method of securing the cessation of export bounties. Nothing has occurred since to detract from the value of this recom-

mendation. The abolition of all drawbacks by levying the tax on sugar as delivered for home consumption is, in fact, the only satisfactory basis for an international convention.

In October next the drawbacks on the export of German sugar are to be reduced. The practical result of these new drawbacks will be to entail a loss to the Treasury on the exportation of refined sugar of 1s. 2d. per cwt. (2·34 marks per 100 kilos.), *in addition* to that which arises from the duty being charged on the roots. (See page 269.)

The United States National Debt in 1866 amounted to £600,000,000, entailing a charge for interest of £29,200,000. In 1886 the debt was reduced to £289,000,000, and the annual charge was £10,200,000. The reduction in these 20 years exceeds £300,000,000; the amount of duty charged upon sugars during this period cannot be much, if any, short of £140,000,000, for the weight of sugar imported during these 20 years was close upon 14,000,000 tons.

Notwithstanding this enormous "protection" there are, probably, at the present time not more than 50 out of the 1,100 sugar planters in Louisiana who can call their estates their own.

Whilst these sugar duties have enabled the Government to so largely reduce their National Debt, they have not been of much benefit, if we are to judge by results, to the domestic producer of sugar.

In a recent number of the *Deutsche Zuckerindustrie* Mr. J. Görz gives the cost of producing sugar in Louisiana on the old system, and the cost in a better appointed factory—

I.

Absolute expenses of a sugar mill on the old system, making 10,000 lbs. per day, averaged as follows:—

	\$
Wages, inclusive of overseers per day	78·00
Coal	60·00
83 tons of cane at 6% yield, 1 ton for 3 dollars.....	249·00
Various materials	15·00
83 tons at 6% yield = 100 cwt. (cost 16/1 per cwt.)....	<u>402·00</u>

II.

The same expenses for a better appointed factory with a production of 40·000 lbs. per day—

	\$
Wages, inclusive of overseers per day	73·25
Coal	72·00
133 tons of cane at $7\frac{1}{2}\%$ yield—1 ton for 4 dollars ..	532·00
Various materials	60·00
133 tons of cane, carriage at 60 cwt.	80·00
133 tons at $7\frac{1}{2}\%$ yield = 200 cwt. (cost $16\frac{1}{4}$ p. cwt.)..	<u>817·25</u>

These figures show the bare cost of production, so far as wages and coal are concerned. To be of any value there should be given, the amount of capital invested, the amount set down, or which ought to be set down, for depreciation, the total of the year's crop, and the value of the sugar produced, and from this last item must be deducted the broker's charges (a no inconsiderable item); and if the estate is mortgaged or is under an advance, which is the case with 19 out of 20 of the Louisiana planters, the charges thereon should be added to the cost.

The price of open kettle sugar at New Orleans would be about 4 cents per lb., or 18s. 8d. per cwt., and of choice white 5 cents per lb., or 23s. 4d. per cwt., and assuming these to be the qualities of I. and II., there is an ample margin for expenses not included in this account, upon the improved system of manufacture.

EXPORT BOUNTY IN DENMARK.—A law has passed the Rigsdag and received the Royal assent, according to which a provisional export bounty for one year of $\frac{3}{4}$ öre (one-tenth of a penny) per lb., or 11d. per cwt. of sugar will be paid 1 (öre = 1·125 pf.) The manufacturers hail this regulation (which will chiefly favour the by-products) as a beginning of Government support. The Danish lb. is slightly heavier than the English.

There is as yet no dependable information as to the intentions of the German Government. The Committee of the Sugar Manufacturers' Association could not ignore the various reports which had crept into the papers, and at their last meeting discussed these, and decided that in the proposed alteration, the tax on the raw material

ought not to be completely given up, but that a tax on the sugar consumed in Germany should be introduced along with the other. The rate at which the tax on the raw material is to be fixed is thought to be 1 mark 20, according to Government views, but 1 mark 50 is thought to be low enough by the Government experts. The resolution adopted was:—

“In case of a continued taxation of raw material and inland consumption, any reduction on the former below 1 mark 50 per metric centner of beets, with a drawback of 15 marks, would inflict serious injury on the industry.”

According to a decree of the Spanish Government, dated 18th March last, the duty on sugar exported from the Philippine Islands was to be reduced by 20 per cent. after 1st April.

Referring to the visible supply of sugar, as published in Mr. Czarnikow's market report of the 15th April, and which gives the figures for the beet producing countries up to the 1st March last, a correspondent writes:—We have now received the reports from the Continent up to the 1st inst., which show the following results:

		Czarnikow's figures.		Latest reports.	
		Tons.		Tons.	
France.....	on March 1 ..	246,351	on April 1 ..	202,500	
Germany	„ „ ..	367,490	„ „ ..	269,400*	
Austria	„ „ ..	160,700	„ „ ..	135,750*	
Holland	„ „ ..	61,757	„ „ ..	60,554*	
Belgium.....	„ „ ..	44,035	„ „ ..	44,459*	
		880,333		712,663	
United Kingdom ..	on April 9 ..	200,004	on April 9 ..	200,004	
Cargoes afloat ...		109,311		109,311	
United States	„ „ 14 ..	125,000	„ „ 14 ..	125,000	
Havana & Matanzas	„ „ 8 ..	107,000	„ „ 1 ..	107,000	
		1,421,648		1,253,978	

This shows a reduction for the month of March of 167,670 tons in the five Continental countries; and with regard to France, the present stock may be considered barely sufficient for consumption up to the end of September next.

AVERAGE EXPENSES AND PRODUCTION OF A CUBAN CENTRAL SUGAR FACTORY.

WITH SOME ACCOUNT OF THE HABITS AND CONDITION OF LABOURERS
ON CUBAN SUGAR ESTATES.

The precarious condition of the sugar industry in almost every quarter of the globe has, for the last three years, shaken every branch of the trade to such an extent that labour, money, and brain, may be said to be impotent in contending with the pressure of competition and of the excess of production over consumption, in combination with many other special circumstances peculiar to each and every country interested in the trade.

The planter of tropical and semi-tropical countries has been compelled to copy or imitate the more enlightened German and French producer. Science, conspicuously represented by the mechanical engineer, the chemist, and agronomist has been summoned to the rescue, and has responded nobly.

But it is not our aim just now fully to elucidate the present condition of the sugar industry in all its ramifications; we shall content ourselves for the present with pointing out what the sugar planter is doing in the West Indies. Having ascertained that *he could not live* by pursuing the old methods inherited from his ancestors, he has, to some extent, studied the course adopted by the more enlightened and successful European beet sugar producer.

After careful investigation he has reached the conclusion, that if sugar can be profitably obtained from cane, it must be by *separating the cultivation from the manufacturing, and by the use of improved machinery and methods.*

This now obvious fact has led to the establishment of the "Central Plantation Sugar Factory" system.

The *Sugar Cane* has recently published some interesting letters and articles showing the different methods and ideas prevailing in several countries. Some have accepted the system, others intend to follow, and we have heard of more that have rejected it.

Let us describe, in full, an average-sized Cuban central plantation sugar factory, of which we have just received a detailed statement.

This statement is based on the productions of 1,333 acres of land (40 Cuban "caballerias de tierra"), with a factory valued at \$150,000, say £30,000, producing about 547,000 cwt. of cane, or 38,250 cwt. (2,500 hhds.) of sugar from the factory.

This plantation ploughs and re-plants 8 caballerias (266 acres) of land every year. Upon an average the cane goes on reproducing for 5 years, and thus we get at the 1,333 acres, the extent of the estate.

(1.) Four ploughmen and two boys, with 16 yoke of oxen, working 8 hours daily, will in 12 days get through 33 acres (1 caballeria). It takes, upon an average, 4,500 arrobas (about 1,000 cwt.) seed cane to plant the caballeria or 33 acres. From these 40,000 to 60,000 bunches are expected to spring up, each with 10 or 12 canes.

(2.) Fertilizing is used at present to a very moderate extent upon this plantation. It takes about 900 arrobas or 22,500 lbs. of fertilizer to every caballeria. Bagasse and brushwood ashes mixed with manure is all that is used for the purpose, but with splendid results. In ploughing, the furrows are made from 10 to 18 inches deep. The cane-seed is covered with 3 or 4 inches of earth. In growing, the cane will peep out of the ground after 15 or 18 days from time of planting. In fertilizing, each bunch of canes takes $1\frac{1}{2}$ ounces of composition. Upon an average each ox produces daily about 30 lbs. of manure, which is mixed with 40% ashes from the furnaces. In four days 100 men will plant 33 acres of cane.

The work of weeding the canefields is done during the non-grinding season, that is to say from May to December. It is perhaps the most unpleasant work that the field hands have to do during the year. It is also the rainy season. The cane planting is done in the spring and autumn of the year, and sometimes by contract.

On the plantation in question this was effected only partly by contract, so that the figures are not given.

Cane-fields in Cuba are weeded three or four times, from May to December, according to their condition. The first work is started when the canes are from 12 to 14 inches high, to prevent the grasses from choking or overpowering them. One hundred field hands provided with hoes weed a caballeria of 33 acres in 4 days. Twenty mules, and thirty men provided with small ploughs or cultivators will do in one day more than 100 men with hoes. When the work is by contract, the price fluctuates between \$200 and \$250, per 33 acres. If the grasses are light it may be done for \$250, or even less. On this plantation all three systems were adopted.

From about the 1st November all eyes and hands on the plantation and in the factory are turned to grinding operations; and from this date up to the middle of December the cold weather and the dry

season sets in, and has an almost magical effect on the cane fields. The cane hardens, and excess of water in the cane disappears, the density of the juice being from 6 to $7\frac{1}{2}$ Beaumé, which at this season of the year is considered fair. During February and March 9° to 10° is the minimum looked for. This year Cuban planters bitterly complain of the poor result as shown by the test. Probably the unusually heavy rains of January has weakened the juices or sickened the canes. The quality of the juice of the cane is a point which deserves more attention than planters generally give to it. Many planters ignore the fact that every degree, Beaumé, above or below, means $\frac{1}{16}$ per cent. more or less saccharine content, equal to $\frac{1}{16}$ of a cent. per lb. (or $3\frac{1}{2}$ d. per cwt.) in the price of sugar, and over 50 cents in the price of each cart load of 2,500lbs. of cane. More attention should be given by planters to the selection of seed-cane. Now that all the cane is sold by weight and quality, the kinds that are best suited to their lands should be carefully studied, and experiments made. In Cuba ten different kinds of cane are well known to planters; yet but few take special notice of the kind that should be selected for planting. With the establishment of the central factory system these points will be forced upon their attention.

As has already been stated this central factory has 40 caballerias-de-tierra, or 1,333 acres of cane under cultivation; that is to say, the owner has 50 caballerias, or 1,666 acres divided amongst 20 planters, who in Cuba are called "Colonists." Each control $2\frac{1}{2}$ caballerias, or say 83 acres, of which $\frac{1}{2}$ caballeria, or $16\frac{1}{2}$ acres are devoted to farm purposes, for the use of the "Colonist." He has a house upon the farm, with 6 to 8 hands to do field work. This represents 140 labourers living in 20 houses, who attend to the 50 caballerias of land in the non-grinding season. These "Colonists" are provided with agricultural implements, and stock returnable on demand.

For two days before the grinding commences the cane growers are notified of the fact by steam whistles, which can be heard at a distance of three miles. The cane weigher stands in readiness, with a Fairbank's platform scale.

There is no portable railroad on this plantation for conveying the canes to the grinding mill. The shape and peculiarities of the place not being adapted for it. It has only a stationary narrow gauge railroad from the factory to the main line, where the sugars are conveyed for transmission to the seaboard warehouse. Consequently, 36

wagons or carts, driven by two yokes of oxen each, are used for transporting the canes from the fields to the mill receiver, where the weighing takes place. These carts are very strong, but rather too heavy. They have each two very large wheels and no springs. They are constructed to carry 5,000lbs., or $2\frac{1}{2}$ tons (Spanish) of canes, but from bad loading they only carry 4,250lbs., or $2\frac{1}{2}$ tons.

We will now see what is going on in the cane fields. Every hand is engaged cutting the canes with a cane cutter, which may be of American, English, or German make. At the present time the English make of the "crocodile's" brand has the preference. A negro or cane cutter cuts the cane with two moves. With the left hand he holds the cane, and with the right he first "tops off" the reed and the leaves, and next with a single stroke cuts the cane to within an inch of the ground.

If the cane is exceedingly long, he will cut it in two by a single stroke.

The reed and canes left from the cane equal about 10% of the weight of the whole cane.

A fair cane cutter will deliver, in a day of 10 hours, from 6,000 to 7000 lbs. sound cane. One hundred cane cutters will therefore provide per day about 26,000 arrobas, or 290 tons for the crushing mill.

Following the cane cutters, in the field, are the "cane lifters"—generally women—who help to gather the canes into heaps, ready for the carts as they come round. To each cane lifter two cane cutters are assigned, sometimes three cane lifters follow four cutters.

As before mentioned, 36 carts are employed on this estate in carrying the canes to the mill. These make 4 trips per day, each drawn by two yokes of oxen, making 144 oxen in all. At the Estate's cattle ranch about 60 bulls, oxen, cows, calves, &c., are kept to meet emergencies, and for herding purposes.

If each cart delivers, each trip, a load of 170 arrobas, or 4,250 lbs. of cane at the mill, it means 680 arrobas or 17,000 lbs. per day. These 36 carts will deliver 144 loads, weighing 24,480 arrobas or about 273 tons sound cane.

The production of cane for the mill per caballeria of 33 acres varies greatly in Cuba, according to the condition of the lands, the system of cultivation adopted, and the weather.

Upon this plantation the average production is 62,000 arrobas, or over 523 tons of sound cane per 33 acres, and this is cut and carried to the mill in a little over $2\frac{1}{2}$ days by about 200 hands in all.

Before going any further, some particulars should be given of the difficulties which a sugar planter has to contend with in adopting the central factory system.

To find the needful number of honest hard-working colonists is no small task, it takes time, money, and patience. In a country like Cuba, which is not over-populated, where labouring men are somewhat scarce, tricky, ignorant, with set habits and ideas, it makes it difficult business for a planter to bring about any marked changes in cultivation or manufacturing, and, in fact, impossible for a planter who has not a sound financial standing, and a large stock of patience. In this latter case the best thing the planter can do is to demolish his manufacturing plant and confine his attention to cultivation only, and to dispose of his canes to the central factory.

In the case of the Central Sugar Plantation Factory of which we are speaking, it has taken three years to effect the change of system, and even now the work has not been in all respects satisfactorily accomplished.

The average "colonist" in Cuba has but limited means, if any at all. He has a family and wants a home, and to secure this he may accept all the conditions laid down by the owner. He starts working to satisfaction, but from the day he reaches the place he will go to the nearest store and try and buy provisions and other goods on credit, payable with the value of the production of the lands assigned to his use when the grinding season shall arrive. He will do as much work as will keep his credit at the store. The storekeeper keeps a vigilant watch upon his movements. As long as he can manage to live from hand-to-mouth his ambition is satisfied; in other words he is satisfied simply to exist, his only concern is to keep in with the storekeeper and his employer. His leisure moments are occupied in smoking or chewing, drinking, eating, and sleeping, and this characteristic is more marked in the negro than in the whites or Chinaman. The "colonist" is not the only part of the Cuban population which indulges in these habits.

A single field-working negro arrives at a plantation seeking employment. He is engaged, and after working steadily for two months he gets his wages, and then under any pretext, leaves the place to live for four months without working, at the nearest town, until his money is done, when he has to return to work again—and in the end his life is spent—a natural result from the system of slavery, for under it the negro worked and lived, as do horses—and now that he has obtained his freedom, it is not to be surprised at if he is as unable to change his habits as a leopard can his skin; another state of things will go on until some general and compulsory system of education is adopted, and then, and not till then, we may see, in the next generation, a great change in these respects.

(To be continued.)

REPORTS OF THE COLONIAL SECTIONS OF THE
COLONIAL AND INDIAN EXHIBITION, LONDON,
1886.

SUGAR.*

BY NEVILLE LUBBOCK.

Before dealing with the exhibits of sugar in the Exhibition, it may be interesting to give a short outline of the sugar industry of the world.

The sugar supply of the world is chiefly derived from the sugar cane (*Saccharum officinarum*) and the sugar beet (*Beta vulgaris*); sugar is also obtained from other vegetable sources, including the sugar maple (*Acer saccharum*), but the total quantity thus produced is relatively small.

The total quantity of sugar produced in the world so far as known is about 5,000,000 tons per annum. But this does not include the sugar produced in India, China, and other tropical countries, which is consumed within those countries. As to the extent of this production no reliable information is available.

Of the known quantity of 5,000,000 tons, about one half is produced from sugar cane, and one half from sugar beet. The superiority of the sugar cane over the sugar beet as a source of supply may, however, be fairly assumed from the following important consideration; that whereas the whole of the cane sugar in the world, with the exception of about 200,000 tons, is produced without any artificial assistance, such as protection or subsidies from Governments, there is not, at the present time, a single pound of beet sugar produced anywhere in the world which has not the advantage of protection in the markets of the country in which it is produced, or of export bounties in the countries which export this description of sugar. It may also be mentioned that whilst raw cane sugars, such as crystallized Demerara sugars, and the fine yellow sugars from Porto Rico and Barbados, are most agreeable to the palate, raw beet sugars of similar appearance are quite uneatable, owing to their exceedingly disagreeable flavour—a flavour which can only be got rid of by refining, or some purifying process analogous to it.

The largest consuming countries in the world, so far as any data are available, are the United States of America and the United

* In this Report India is included.

Kingdom. The consumption of the United States for the twelve months ending October last, amounted to about 1,300,000 tons, and that of the United Kingdom for the year 1885 was estimated at 1,200,000 tons.

The sugars exhibited by our Colonies were all produced either from the sugar cane or the sugar maple, the production of sugar from the latter source being confined among our Colonies to Canada.

The following Colonies, in addition to India, exhibited samples :— Canada, New South Wales, Queensland, Natal, Fiji, Ceylon, Mauritius, Hong Kong, British Guiana, Trinidad, Barbados, Montserrat, St. Kitts, Antigua, Tobago, St. Lucia, St. Vincent, British Honduras, and Jamaica.

This list is sufficient to show how large is the area in which sugar is produced, and to prove that we need have no fear that an adequate supply of cane sugar will not at all times be forthcoming to supply the wants of the world. Moreover, the qualities of sugar exhibited range from the finest sugar candy to the low brown moist description, and there is thus no lack of variety.

The total quantity of sugar produced annually by our Colonies and exported from India is about 500,000 tons. The industry is therefore an important one, and one which, in the absence of the artificial aid which its rival beet sugar obtains, is capable of almost indefinite expansion.

It being impossible within the limits of this Report to deal adequately with each individual specimen in detail, a few remarks are offered upon the general characteristics of the exhibits from each Colony; and finally a description and classification of them.

It may be desirable to explain, for the information of the uninitiated, that sugars may be divided into two categories.

1. Pure crystallized cane sugar.
2. Impure sugars.

It may be further explained that pure crystallized cane sugar is perfectly white, and may be the product of the sugar cane, the sugar beet, the sugar maple, or many other vegetable substances. Pure cane sugar, or as it is sometimes called *sucrose*, is a well defined substance whose chemical composition is invariable, and whose chemical formula is $C_{12}H_{22}O_{11}$. Impure sugars are usually a mixture of this substance with other matter, which generally consists of a small quantity of inverted sugar, or *glucose*, whose chemical

formula is $C_{12}H_{24}O_{12}$, water, and a small quantity of certain salts generally described in analyses as *ash*, and in the case of very inferior sugars, certain other organic matter which may be generically described as *dirt*. This explanation will enable the reader to understand the typical analyses which follow the description of the exhibits. For the sake of comparison, India has been included.

INDIA.

Approximate annual export : 50,000 tons.

The samples exhibited, seven in all, were of a high class, but quite unsuited for this market. The loaf sugar, although by analysis but little inferior to the loaf sugar manufactured in this country, is entirely lacking in brilliancy, and has also the appearance to an uneducated eye of being far more inferior to the loaf to which we are accustomed than it is in reality. The British public attaches more importance to the appearance of sugar than to its intrinsic value. Hence the sugars most suitable to the English market are those which are most attractive in appearance. The same remarks apply to the white and grey granulated. The bulk of the sugar produced in India, and of that which comes from India to this country, is commonly known by the name of jaggery, but this description of sugar was not represented by any specimens.

CANADA.

Extent of production unknown.

Canada sent some excellent samples of refined sugar, both loaf and granulated, made from imported sugars. She also exhibited specimens of the well-known maple sugar. This sugar cannot apparently be produced at a price approaching cane sugar; but it has an agreeable flavour, and hence there is a certain demand for it, rather in the nature of a sweetmeat than as sugar.

Maple syrup is also a very popular article of food in America and Canada; but the industry appears to be almost outside of what may be properly called the sugar industry.

NEW SOUTH WALES.

Approximate annual production : 17,500 tons.

The exhibits from this Colony consisted of white cubes, crystals, granulated, grey crystals, semi-grainy, and the ordinary brown second runnings. These sugars, although of a high class, are not, as already explained, a profitable description of sugar to make for this market.

They are no doubt suited for the local consumption. They rarely find their way to this country, and probably look entirely to Australia for a market.

QUEENSLAND.

Approximate annual production : 55,900 tons.

The sugars exhibited in this section were principally white crystals and white moist. The sugars, with the exception of some specimens of average yellow crystals, are unsuited to the English market, for the reason explained in the case of the Indian exhibits.

NATAL.

Approximate annual production : 16,000 tons.

There was a great variety of specimens from this Colony, but none were of a very attractive appearance. It would be well worth the while of the Natal sugar manufacturers to endeavour to improve their sugars in this respect. From the appearance of the sugars, proper attention is apparently not given to the clarification of the juice before evaporation. There were two samples of brown concrete which were very suitable for refining. The higher grades of crystallized sugar were such as would be described in the London market as very grey, and would only be used by refiners. Sugars of the same analysis, but of a bright yellow colour, would be worth fully £2 per ton more than the samples shown.

Fiji.

Approximate annual production : 12,000 tons.

The examples exhibited from this Colony were of a very superior quality; the white crushed being almost bright, and the yellow crystals of large grain, far too large however for the English market. Fiji probably looks more to Australia than to Great Britain for her market, and has no doubt adapted her makes to the taste of the Australians. The sugars had a clean healthy appearance, and would appear to indicate a good quality of cane juice and careful manufacture.

CEYLON.

Approximate annual production : 350 tons.

Ceylon sent but a poor show. A few samples of small-grained dirtyish white sugar, apparently produced by considerable washing, a very extravagant method of improving quality; also a few cakes of concrete. These had been put into small matted baskets, holding about $\frac{1}{4}$ lb. They must therefore either have been specially made for

a sample or for some local demand, as in this form they would not be suitable as an article of commerce. They had the appearance of having been made for sale as sweetmeats.

MAURITIUS.

Approximate annual production: 120,000 tons.

Mauritius sent one specimen of loaf sugar of good quality; but, like the loaf sugars of all the Colonies, far inferior in appearance to our English make. The other samples were chiefly white crystals, not very bright, second runnings; and a peculiar large yellow crystal, quite unknown in this market, and specially made for the brewers' use in the East. It is certainly curious and remarkable that this description of sugar should be specially made for the use of brewers, for whom, except in respect of its cleanliness, it is eminently unsuitable. Before sugar is available for the purpose of producing the alcohol required for beer, it must be inverted, and it would therefore seem more natural to use inverted sugar, which can be produced from the lowest descriptions of raw sugar and rendered perfectly clean by the use of charcoal, rather than to use the highest class of crystallized sugar to be inverted subsequently during the process of fermentation.

HONG KONG.

The sugars exhibited from Hong Kong, unlike those from our other Colonies, were *refined* sugars: that is, they were made from imported sugars which had been redissolved, not directly from the cane juice. They comprised all the qualities usually turned out by refiners, from sugar candy to low pieces. They were very creditable to the China Sugar Refining Co., although they did not come up to the best makes of this country.

WEST INDIES AND BRITISH GUIANA.

Approximate annual production: 280,000 tons.

The sugars exhibited by these Colonies were various, and included the brown muscovado, so much liked by our refiners and those of the United States; fine yellow muscovado suited for grocery purposes, which chiefly comes from Barbados; the well-known bright yellow crystallized, mostly from Demerara, but now also largely produced in Trinidad, Barbados, and some of the other islands; and finally white crystals. These sugars are all eminently suitable for the English market, except the white crystals, which cannot compete with those of our refiners, not on account of any real inferiority, but from the

impossibility of producing, at a cost which would be profitable, that sparkling appearance which our refiners, working on a large scale, can produce at a merely trifling expense.

I am much indebted to Mr. W. E. Halse, the well-known analytical chemist of Mark Lane, for the assistance he has afforded me in drawing up this Report, and for the typical analyses which accompany it. I am also indebted to Mr. John Mc.Carthy, the Government Chemist of Trinidad, for his assistance in collecting and arranging the numerous samples which had to be examined and classified.

CLASSIFICATION OF EXHIBITS.

No. of Samples.	Description.	No. of Samples.	Description.
INDIA.		CEYLON.	
1	Loaf sugar.	1	White crystals.
5	White crystals, bright.	2	White, small-grained.
1	Low grey crystals.	2	Molasses and syrups.
CANADA.		3	Concrete, brown.
1	Loaf.	MAURITIUS.	
3	Granulated white.	1	Loaf.
2	Maple.	33	Greyish to fair white grainy and crystallized.
NEW SOUTH WALES.		5	Large brewers' crystals.
1	White cubes.	7	Molasses sugar, fine grey to very low dark.
11	White crystals.	1	Concrete.
2	Semi-grainy.	HONG KONG.	
7	Brown syrups.	<i>Refined sugars :—</i>	
QUEENSLAND.		1	White sugar candy.
47	White and greyish-white crystals.	2	Loaf.
8	Low grey crystallized and semi-grainy.	5	White grainy and crystallized.
14	Molasses sugar, brown to coloury.	4	Yellow pieces.
NATAL.		BRITISH GUIANA.	
4	Dull greyish white.	15	Crystallized, pale yellow to white.
12	Very grey grainy.	21	„ good to fine yellow.
4	Fair grey-brown syrups.	18	„ low to good yellow.
2	Fryer's concrete.	9	„ grey refining.
Fiji.		10	Molasses sugar, low dark brown to fine yellow.
3	White crystals.		
7	Large greyish-yellow crystals.		
8	Molasses sugar, fair to low dark brown.		

No. of Samples.	Description.	No. of Samples.	Description.
TRINIDAD.		ST. LUCIA.	
7	Crystallized, yellowish white to white.	1	Crystallized, white soft dirtyish small grained.
11	Crystallized, yellow grocery.	7	Crystallized, yellowish white to white.
5	„ grey refining.	1	Crystallized, medium yellow.
7	Molasses sugar, fair brown.		
BARBADOS.		ST. VINCENT.	
4	Crystallized, yellowish white to white.	2	Low yellow grainy.
12	Crystallized, yellow.	4	Muscovado, Dutch, No. 9.
2	Muscovado, Dutch, No. 11.	7	„ „ „ 11.
10	„ „ „ 12.	7	„ „ „ 12.
9	„ „ „ 13.		
2	„ „ „ 14.	DOMINICA.	
1	„ „ „ 15.	1	Muscovado, Dutch, No. 8½.
MONTSERRAT.		1	„ „ „ 11.
1	Muscovado, Dutch, No. 8.	3	„ „ „ 12.
2	„ „ „ 9.		
ST. KITTS.		BRITISH HONDURAS.	
1	Crystallized, white.	1	Muscovado, Dutch, No. 9.
2	„ fair yellow.	2	„ „ „ 11.
1	Muscovado, Dutch, No. 10.	2	„ „ „ 12.
ANTIGUA.		1	„ „ „ 13.
4	Muscovado, Dutch, No. 10.	1	Concrete, good brown.
10	„ „ „ 11.		
6	„ „ „ 12.	JAMAICA.	
TOBAGO.		3	Crystallized, dull grainy white.
1	Muscovado, Dutch, No. 7.	4	„ greyish yellow.
3	„ „ „ 10.	1	Muscovado, Dutch, No. 9.
4	„ „ „ 11.	2	„ „ „ 11.
2	„ „ „ 12.	2	„ „ „ 12.
1	„ „ „ 14.	3	„ „ „ 13.
		3	„ „ „ 14.

TYPICAL SUGAR ANALYSES.

White Crystallized and Loaf.

Cane Sugar	98.00 to 100.00
Glucose	.50 „ 00.00
Water	1.00 „ 00.00
Ash	.30 „ 00.00
Organic matter other than sugar	.20 „ 00.00
	100.00 100.00

Fine Pale yellow Crystallized.

Cane Sugar	96·00 to	98·00
Glucose	1·00 „	·50
Water	1·50 „	1·00
Ash	1·00 „	·30
Organic matter other than sugar	·50 „	·20
	100·00	100·00

Low to good yellow Crystallized and grey refining Crystals.

Cane Sugar	93·50 to	96·00
Glucose	2·50 „	1·40
Water	2·00 „	1·20
Ash	1·50 „	1·00
Organic matter other than sugar	·50 „	·40
	100·00	10·000

Muscovado, Dutch, Nos. 9 to 14.

Cane Sugar	84·00 to	93·00
Glucose	6·00 „	3·00
Water	5·50 „	2·00
Ash	1·50 „	1·00
Organic matter other than sugar	3·00 „	1·00
	100·00	100·00

URGENT APPEAL TO THE LOUISIANA SUGAR PLANTERS TO PUT THEIR SHOULDERS TO THE WHEEL.

The following stirring circular has just been issued by the Committee of the Louisiana Sugar Planters' Association.—“Protection to all American enterprise” is the password.

To the Sugar Planters of Louisiana.

We, the undersigned committee of the Sugar Planters' Association, have been instructed to address this circular to you, calling upon you to arouse from your long continued apathy and keep pace with the army of progress.

Some years ago, a few of the most energetic and progressive of the one thousand sugar planters of Louisiana threw themselves together for the purpose of resisting the legislation then aimed at the best interests of this State, the sugar industry, and we are pleased to say, thus far, they have done much good in preventing adverse legislation, but it can not be expected that they can continue the fight against an ever-vigilant and powerful enemy. Many of the merchants of this

city have recognized the vital importance of this Association and have joined with us in our exertion to prevent the sugar interests of Louisiana being offered up as a sweet and savory sacrifice upon the altar of political expediency.

Under the circumstances, it becomes the bounden duty of each and every sugar planter, whether he represents one or one thousand tons of sugar, to be on the alert, to come forward and join his fellow planters and present a united front to the baffled, but by no means vanquished, foe; in other words, to thoroughly organize the entire sugar interests of the whole country, East, West and South, against any change of the tariff.

Come forward, gentlemen, and fight for your interests; be not afraid or ashamed to stand up manfully for *protection as a vital principle*. Do not allow your political training and sectional prejudices to manacle your riper and better judgment. The man who dies at sixty with the same views held at twenty-five, has lived to little purpose. Wake up! A mighty change is taking place throughout the South; the geologist has struck the bosom of the South with his magic wand, and it is pouring forth a mighty stream of activity and prosperity. Money and men are organizing to build up large interests in every State and the password is: "*Protection to all American enterprise.*"

So, come forward and put down not only your names, but your money also. Brush up your experience as planters and deposit it in the common treasury in order that all may profit thereby. Individually we can do but little, but as a well organized Association, with active and vigilant officers, backed by earnest and working committees; with a sufficient amount of money in your treasury to make yourselves heard and felt in the national Congress, you can prevent the utter ruin now menacing you and those you are, by both human and divine law, bound to protect and provide for.

Are you insensible to the fearful blow given to you and Louisiana by the infamous Hawaiian Treaty and the shameful attempt on the part of the United States Senate to continue the same for an additional term of years? Are you willing to lie supinely, hugging to your bosom the fond delusion of free trade and party allegiance, until every vestige of your property is absorbed by others? Rise in your might, and let organization be the order of the day; but bear in mind that in all great and successful undertakings, there must be a head or governing body, and that body must have its domicile in the business

centre of the State, hence it must be in New Orleans. We fully appreciate the importance and value of your local organizations, but to make your work truly effective and for the general good, you must also be members of the Mother Association, for, only through such a channel can the fruits of your organizations be conserved and made available for the general good, and for influencing national legislation in your behalf.

Besides, your pecuniary contributions are essential to the maintenance of our experimental farm, which is, in truth, the bank from which we must draw all positive information, in order to become successful agriculturists. Therefore, we, in the name of the Louisiana Sugar Planters' Association beseech you to join us in striving to restore prosperity to our State.

We have a fine hall and propose to have it so arranged that you can go direct from the cars or boat to it, where you can register your name and stopping place, leave your valise in charge of a porter, telephone to your merchant, meet the Secretary of the Association, and on certain days of the week meet Prof. W. C. Stubbs, who is in charge of the sugar experiment station, who will ever be happy to give you any information which he may possess in relation to cane, sugar, rice, corn, oats, drainage, fertilization, or analysis of soil. You will also receive copies of the bulletins issued by him in relation to all work done on the farm, and if you will become members and aid us in furnishing you, together with the bulletins, clippings from both home and foreign agricultural journals on points most valuable and interesting to you.

Come, gentlemen, and join us in this good work. You can never make a better investment. Do you not see the farmers from the far west coming to Mississippi and your own State to urge you to action? The cotton men of North Louisiana are beginning to have the Free Trade scales removed from their eyes, for they know that the sugar section of the State, together with this *city*, pays *three quarters* of the money into the State Treasury; besides, we do not believe they are willing to crush their own people in order to enrich O. Spreckles & Co., and those who employ coolie labour. Many of the western people recognize the fact that the west and south are bound together by strong ties of friendship and business interests, and that there is a reciprocity existing between them far superior to and more rational than the Hawaiian.

In conclusion, we will say: send in your names and subscriptions, only \$10 a Year, and become active working members of our Association. Address J. Y. Gilmore, Secretary and Treasurer, 6, Camp Street, New Orleans. Wm. E. Brickell, E. H. Lombard, L. C. Keever, Henry McCall, L. M. Soniat, John Dymond, Emile Rost, Committee.

OUTLINES OF A NEW ATOMIC THEORY.

Dr. Phipson, whose name is well known to our readers, has issued a small pamphlet, entitled, "Outlines of a New Atomic Theory" from which we make the following extracts:—

"The term *Phlogiston* is used in the following notes in a somewhat different sense from that in which it was employed by the older chemists, some other term might have been equally acceptable but this one already belongs to chemistry, and therefore we have a predilection for it."

"On a general survey of organic and inorganic nature, our attention is arrested by a number of facts, which, though they have hitherto defied explanation, the present suggestions appear to account for, so far as we can account for anything by connecting facts with theory. Nevertheless, the theory we now put forth does not necessitate any great change in the nomenclature or teaching of chemistry; if it represents truth, it should be given to the world, although for many years we have hesitated to publish it."

"In chemistry we have an immense list of substances all of which present themselves as colourless transparent fluids, or as white powders, though differing as widely in their properties as pure water and prussic acid on the one hand, or arsenious acid and sugar, on the other. A wineglass filled with water, alcohol, ether, sulphuric acid, solution of potash, &c., presents no difference to a child or a savage; neither would it be considered anything else than water if it contained a solution of some nitrate, chlorate, sulphate, sugar, strychnine, veratrine, ammonia, cyanide of mercury, and so forth.

In like manner all the metals present what is termed the "metallic aspect"; they all show a great similarity of physical and chemical properties, so that tin, silver, cadmium, antimony, zinc, sodium, aluminium, magnesium, lead, &c., would readily be mistaken, one for the other, by a child or an inexperienced person. Again, the alkaloids, sugars,

glucosides, essences, &c., all present a great similarity in physical and chemical properties, which extends to their therapeutic qualities also."

"Another fact, which has often struck chemical philosophers, but has hitherto baffled all attempts at explanation, is that of all the numerous *elements*, or simple bodies, which compose our globe, *four alone* are found sufficient to build up the whole of *organic nature*, animal and vegetable, and to form the thousands upon thousands of substances known as *organic compounds*."

"One more fact, amply demonstrated by the numerous analysis published in one of our works, is that meteors or aërolites coming from distant regions of space, bring no new matter to our globe; they are composed of the *same materials* as our earth. It will be seen, presently, that the same materials may possess *different properties*, according to the circumstances in which they are placed."

"A phenomenon readily explained by our new atomic theory, though it has not hitherto been accounted for satisfactorily by any hypothesis, is that observed when two substances of heterogeneous natures, such as two metals, are brought into contact, an electric current, or electric calorific or magnetic manifestations, immediately occur."

"The old notion that matter is composed of 'atoms and spaces' is doubtless correct, and it can be argued successfully that atoms are extremely minute spheres. When one substance is divided by another, as when an apple is cut by a knife, the latter passes between the atoms, for *matter is impenetrable*; that is to say, the same space cannot be occupied at the same time by two groups of matter, or by two substances; one must make room for the other, and the *space between the atoms* is what we designate as *phlogiston*."

"The whole question of the atomic constitution of matter is contained in the theory of equal gaseous volumes, or better, of the *combining volumes of matter in the state of gas*. When we consider this subject, we are met at once by a dilemma. Physical experiments having shown that, between certain limits of temperature, equal gaseous volumes dilate or contract equally for equal amounts of heat or pressure, it was argued that equal volumes of gases contain the *same number of atoms* of the *same size*, and placed at the *same distances* apart. This of course implies that the atoms are of *different weights*; for instance, the atom of H weighing 1, that of N weighs 14, &c. But it soon came to be seen that this could not be, because in equal volumes of certain compound gases we know that there cannot be an equal number of atoms.

“The next supposition was that the atoms in equal gaseous volumes may be of *different sizes*. Then the atom of H would be 14 times smaller than the atom of N, &c. There is nothing to be said against this hypothesis, except that it does not explain anything. It merely asserts that the atom of N is 14 times as heavy as that of H, because it contains 14 times more matter. This notion is on many accounts improbable, unphilosophical, and explains nothing. But another proposition, which we shall now bring forward, does explain a number of phenomena, that otherwise we find it impossible to account for.

“This proposition is that equal gaseous volumes contain a *different number of atoms*, all of the *same size and same weight*. This implies that the *atoms* are all of the *same nature*, and proclaims the *unity of matter*. Whatever substance may be under consideration, its atoms are all of the same nature, and they are separated by space which we call *phlogiston*,—a term that implies movement, light, heat, electricity, &c. The greater the amount of *phlogiston*, the greater the *energy* of the system of atoms termed *elements*. Thus, H is the most energetic system of atoms known; it has the *greatest amount of phlogiston*, in other terms, the *motion of its atoms is the most extensive*.”

“The matter of all the elements is, therefore, identical; the *phlogiston alone varies*, that is, the *distance or space* between the atoms (considered at rest) or their *extent of motion*. A chemical element is therefore a *system of atoms*, the nature and properties of which system depend on its *phlogiston*, and the amount of the latter is deduced directly from the balance,—from the *weights which combine together*. Thus in equal volumes of H, N, Cl, &c., we admit that there exist, say, 10,140,350 atoms of the *same size, same weight, and same nature*; and if we could volatilize without decomposing solid bodies, such as sulphate of iron for instance, so as to consider them under the same gaseous volume, we should find the same law hold good for them, and that an equal gaseous volume of ferrous sulphate, for example, would give, as compared with the substances above named, 760 atoms of the same nature as those of H, N, or Cl.”

“It will be seen by this that the *properties of a substance* depend, not on different kinds of matter, but on the different amounts of *phlogiston* that separate the atoms, and cause them to move in certain set systems. The atomic system called H is different from the atomic system called N, because the atoms of the latter system are separated by less space,—the system possesses less *phlogiston*.”

“We thus see that, as everything depends on gravitation, the

systems of atoms (elements) known as iron, sulphur, oxygen, &c., on this globe, may possess very different properties on the planets Venus or Jupiter, for instance, on account of the different distances of these planets and our globe from the sun. Spectral analysis, like the fall of aërolites, proves that we have the same nature of atoms as far off globes; but we see that the properties of a substance depend on its *phlogiston*, which in its turn depends on gravitation, so that although the matter is identical with that of our earth, the physical and chemical properties must be different from what they are on this globe."

"We also see how the whole *organic world* is made up of a few systems of atoms (elements) only; they are those which contain the *most phlogiston*, and, consequently, possess the most energy; they constitute the nearest approach to vitality."

"Again, when two heterogeneous systems of atoms are brought into contact, a vibration ensues such as astronomers have termed *perturbation*; it is caused by a *slight deviation of the movement*, a *slight change in the phlogiston* (which may be temporary or permanent), and is carried away along a "conductor" in the form of an electric current or otherwise. In *allotropic* bodies the original phlogiston is more or less permanently modified; and could this allotropism be pushed far enough, the "transmutation" of the elements would undoubtedly ensue."

"It will readily be perceived that this theory explains a mass of facts which are not even alluded to in the foregoing notes. And though it leaves unaccounted for a certain number of physical phenomena, these will probably be explained in time without disturbing it."

FOREIGN BOUNTIES ON SUGAR.

MEETING AT GREENOCK.

A largely attended meeting was held in the Bank Street Hall, Greenock, on April 5th, to consider the question of foreign bounties upon sugar and other articles of manufacture. Mr. George Ferguson occupied the chair.

Mr. THOMAS NEILL, sugar refiner, in the course of a lengthy speech, said the question before the meeting was whether they would allow foreign bounties to continue in order that the foreigner might send goods into this country cheaper than at their natural value, and thus destroy that free trade which they were told would be the

salvation of the empire. The employers were few in number. It was the men who were the many, and it was the men who must help them to go to the Government to demand a conference. They were those who advised patience, but when they remembered that this question had been going on for 23 years, he thought the most patient men would admit that they had pretty well come to the end of their tether, and that action should be taken.

Foreign countries would not be in a hurry to give up bounties unless they were compelled to do so by Great Britain. They were told they must not do anything to stop the bounties because it would injure the consumer. But the bulk of their men were those who would tell them in the next breath that they would support any Government which would use every means diplomatically to abolish the bounties. But why not use the means which would be most efficacious?

Mr. Neill then read extracts from utterances of Mr. Gladstone and Lord Derby to prove that the bounties were not beneficial to the consumer. Mr. Giffen, of the Board of Trade, had stated that the benefit to this country amounted to £3,000,000, but the speaker went on to show that the real saving was only £150,000, or something like 2d. per head per annum of the population. If the bounties continued, it would not be long before there would be no sugar-houses going in Greenock. He did not think this a very startling prediction, because he thought it was very apparent to all.

It was said there were two remedies. He knew of only one. Mr. Giffen was asked by one of the Royal Commissioners how these bounties were to be met. His answer as reported he had since denied, but there could be no doubt he did express himself to the effect that his remedy was to reduce the profits of the masters and the wages of the workmen. In answer to that, he might say that the masters' profit had been reduced long, long ago—in fact, he might say it was a minor quantity now. As for the wages of the workmen, these had been in many instances greatly reduced. The other remedy, that of a countervailing duty, had practically been recommended by the Royal Commission on the Depression of Trade. He knew it was said that this was Protection, but he denied this; Mr. Cobden's definition of Free Trade was to obtain articles at their natural value. By the imposition of the countervailing duty sugar would be sold at its natural price in this country. He advised that a treaty should be got up to do away with these bounties, and enacting a penalty for a contravention of its conditions, by which they would be rid of the bounties in a month.

Mr. ROBERT KERR, shipowner, also spoke in favour of the imposition of a countervailing duty, and votes of thanks having been passed to both speakers and the chairman, the proceedings terminated.

CERTAIN POINTS IN AGRICULTURAL CHEMISTRY, CON-
SIDERED IN REFERENCE TO THE SELECTION AND
APPLICATION OF MANURES FOR THE SUGAR
CANE IN THE ISLAND OF BARBADOS.

*Being a paper read before the Barbados General Agricultural Society,
November, 1886.*

By J. B. HARRISON.

Continued from page 199.

Now the aim of the majority of sugar cane manure makers, at the present time, appears to be to make mixtures of sulphate of ammonia and superphosphate, containing as large a proportion as possible of "soluble phosphates" and as a little potash. It is evidently no longer safe for us, with sugar selling at \$2.00 per 100lbs., to trust to ascertaining the manurial requirements of our plant by using only English manure makers' ideas; we must find them out for ourselves, and the principal part of the problem is to ascertain the proportions of phosphates and potash required for feeding the sugar cane, and the forms in which they are most acceptable to it as plant food. This problem can be solved by ourselves, or rather by that portion of us who are Proprietors or Attorneys. It

"OS AMMONITE"—CANE MANURE.

Moisture	12.26
<i>a</i> Ammonium Sulphate	27.62
<i>b</i> Organic Matter	10.79
Sand and Silica	1.25
Monocalcium Phosphate.....	15.90
<i>c</i> { Equal to Tricalcium Phosphate rendered Soluble (21.07)	
{ Reverted Phosphates.....	1.70
Insoluble Phosphates	2.02
Calcium Sulphate	20.48
<i>d</i> Alkaline Salts, &c.	7.98
	<hr/>
	100.00
<i>a</i> Contains Nitrogen	5.86
Equal to Ammonia	7.11
<i>b</i> Contains Nitrogen	trace
<i>c</i> Assimilable Phosphates	22.77
<i>d</i> Contains Potash	5.12

can be done by laying down in the different districts of the Island, upon soils of different character, and under different climatic influences, parallel experiments to those being conducted at present at *Dodds*; and if this were done we should approach the solution of two other questions, one of which is also a financial one, viz., what changes do the manurial requirements of the sugar cane undergo under the influence of different soils, with stores of plant food differing in quantity and quality, and under different atmospheric conditions, and (most important of all agricultural questions) with what manurial agents, and in what quantities are the ascertained manurial requirements of the sugar cane in different soils, and under different climatic conditions to be most certainly and profitably satisfied? I do not of course, at present, advocate attempting to carry on experiments in the complete way in which I hope in future years to carry on our *Dodds'* ones, but in such manner that the planter shall ascertain the weights of canes produced, the volume and density of the juice yielded by them; which data alone can give us very much information; perhaps, practically speaking, almost as much as more complete ones. The latter must follow when we shall have established that great want of this Island and of the whole West Indies, an Agricultural College, or, preferable, *station*, devoted to the study of the growth and requirements of tropical plants in tropical climates and to imparting the knowledge so gained to the younger planters. I am myself convinced that far more success, both socially and financially, will be attained by directing the studies of our youth to the phenomena of nature rather than as at present, chiefly to the tales and traditions of the ancient Greeks and Romans.

I am afraid that the majority of those present will consider that I have dwelt too long upon the scientific portion of my subject; but I shall not apologise for having done so, as the practical part of it, and its successful pursuit, must be based upon scientific knowledge; I will however only allude to one more theoretical point, and that is: which ingredient, if any, of manures, holds out the best promise of assisting us in growing canes richer in sugar than our present ones? Theoretically, there is one, and that is an ingredient which you will begin to think I am harping upon too much—potash. In order to assist us in understanding this point clearly, we must remember that in cultivating plants for food, our object is to cause the plant to draw from the air carbonic anhydride, and to assimilate the carbon contained in it by combining it with the elements of water to form starch,

sugars, oils, &c. This assimilation is carried on by the chlorophyll, or green colouring matter of the leaves, and the relative proportion of this substance present may be estimated by the depth of the green. It has been proved experimentally that depth of green colour by no means necessarily implies a greater amount of carbon assimilation, and that it is associated with, and probably caused by, a relatively high proportion of nitrogen in the product. In chlorophyll, as in blood, a minute quantity of iron is always present, and is, in fact, absolutely necessary for its production. When there is any deficiency in the mineral food of plants a deep green may be developed by a purely nitrogenous dressing, and in this case we shall find that the production of chlorophyll is not followed in proportion by the assimilation of carbon, but that if we add the necessary mineral ingredients to it, although the deep green will not be so apparent, the assimilation of carbon will be very greatly increased, the decrease in the depth of green colour, or apparent amount of chlorophyll, being due, not to any real decrease, but to the amount of it, occasioned by the nitrogenous dressing, being spread over a far greater space, produced by the increased assimilation of carbon, and consequent greater formation of non-nitrogenous substances. Vegetable physiologists have proved, by laboratory experiments, that the presence of certain ash constituents, and especially of potassium, is essential for the assimilation of carbon, no starch being formed in the grains of chlorophyll in the absence of this substance. In fact Sachs, one of the highest authorities, has said, "Potassium is as essential for the assimilating activity of chlorophyll as iron is for its production. As an increase in the proportion of sugar present in the canes would mean, and could only arise from, an increased assimilation of carbon, and since potassium is the dominant element for such increase, it certainly appears advisable that experiments should be carried out in this direction by the application of increased proportions of potash salts. Very many planters, chemists, and manure makers, fear that an increased application of potash may lead to an excessive production of molasses; as, however, the potash, if absorbed in larger proportion, will tend to accumulate in the portions of the cane where growth and assimilation is most rapid, I believe that, whilst we may find the potash in the cane tops and leaves increased, the juice in the cellular tissue will be little, if at all, affected, and, from certain facts in vegetable physiology, I should not be surprised to find the percentage of potash in the cane juice diminished, instead of increased, by the extra amount

applied. You will perhaps remember that I specially drew your attention to the large amount of potash contained in sheep and in pen manure; I will now ask those of you who have largely used the former manure whether you have ever noticed any increase in the production of molasses in cane juice from canes manured with it; and also, whether you have not sometimes noticed such increase in that from canes grown with heavy dressings of manures consisting almost entirely of sulphate of ammonia and superphosphate?

What are the practical points in the selection and application of cane manures we have arrived at, at present, from our theoretical reasonings this evening? The necessity of restoring to our soils, as far as lies in our power, certain of the mineral constituents, and the nitrogen which the crop has removed from them; and that this is most perfectly done by manuring the land before planting the canes with heavy dressings of pen manure, with sheep manure, or an artificial manure closely resembling them in composition. The points which we must bear in mind for our guidance in the selection of the latter are:—that as the cane top as planted contains in itself a sufficient supply of nitrogen for its earliest stage of growth, we do not require a rapidly acting highly nitrogenous manure; that

OHLENDORFF'S EARLY CANE MANURE.

One hundred tons ex. "Atlantis," November 8th, 1886.

Moisture	13.24
<i>a</i> Ammonium Sulphate	8.42
<i>b</i> Organic Matter	22.28
Sand and Silicia	2.46
Monocalcium Phosphate	11.53
(Equal to Tricalcium Phosphate rendered soluble	(15.29)
<i>c</i> (Reverted Phosphates	3.59
Insoluble Phosphates	.99
Calcium Sulphate	21.96
<i>d</i> Alkaline Salts, &c.	15.53
	<hr/> 100.00
<i>a</i> Contains Nitrogen 2.00, equal Ammonia	2.43
<i>b</i> " " 2.06 " "	2.50
<i>a & b</i> Contain Nitrogen (total)	4.06
Equal to Ammonia	4.93
<i>c</i> Assimilable Phosphates	18.88
<i>d</i> Contains Potash	8.34

ammonia salts are not available as plant food to very young plants—in fact to these, if present in any quantity, they may act as plant poison; and that as nitrates would be lost by drainage, long before the young cane plant had developed sufficiently to require them, the source of nitrogen in the manure should be mainly easily decomposable organic matter, such as blood, or dried flesh, and the percentage of nitrogen present need not exceed 4 to 4½. The phosphates should be in fair proportion; and as any acidity in the manure must be most carefully avoided, a manure having, say, only from 12 to 15 per cent. of “Soluble Phosphates” and with rather a high proportion of reverted and insoluble, preferably bone, phosphates, should be chosen. This early stage is probably the best time to apply potash, and as I have pointed out to you that it is in pen and sheep manure, this should be in a relatively high proportion, say from 5 to 7½ per cent. The model of such a manure is found in *Ohlendorff's Early Cane Manure*, a composition introduced here by the Anglo-Continental Manure Company last year, and which already shows promise of

BARBADOS PHOSPHATES.

Dried at 212° F.

	No. 1.	No. 2.
Organic Matter	7·21 ..	1·24
Sand and Silicia	7·19 ..	2·95
Iron peroxide and Alumina	8·08 ..	2·32
<i>a</i> Phosphoric Anhydride	33·42 ..	36·21
Calcium Oxide	35·88 ..	50·84
<i>b</i> Carbonic Anhydride	2·37 ..	6·36
Alkaline Salts, &c.	5·85 ..	·08
	<hr/> 100·00	<hr/> 100·00

PHOSPHATIC MAILS (not dried).

No. 1 contains Phosphoric Anhydride . . .	·227 per cent.
Equal to Tricalcium Phosphate ..	·50 ..
No. 2 contains Phosphoric Anhydride . . .	3·33 ..
Equal to Tricalcium Phosphate ..	7·26 ..
No. 3 contains Phosphoric Anhydride ..	3·66 ..
Equal to Tricalcium Phosphate ..	8·00 ..
No. 4 contains Phosphoric Anhydride . . .	3·76 ..
Equal to Tricalcium Phosphate ..	8·21 ..
No. 5 contains Phosphoric Anhydride . . .	14·83 ..
Equal to Tricalcium Phosphate ..	32·33 ..

becoming an established favourite with our leading planters. On certain estates in the northern districts of the island are found deposits of phosphate of lime in only a partially mineralised state, and also deposits of phosphatic marls containing from 5 to 30 per cent. of phosphates. Where these are obtainable they should be reduced to powder and sprinkled on the pens in the manner in which I have recommended megass ash to be applied. Estates having distilleries should also do everything in their power to return the dunder to the soils, this being worth from 9d. to 1s. 6d. per puncheon as a manure. Where practicable, it should be added to the pens and compost heaps. An excellent way of utilising this liquid during crop time would be by running it in layers of about two inches in depth under the megass furnaces, where a large proportion of its water would be evaporated away by the waste heat, and the red hot megass ash, falling into it, would crumble into fine powder. In this way a manure having very valuable fertilizing properties might be obtained. Where the stock is well fed, and pen manure made up and supplemented by the use of a suitable early cane manure, it will be found that in many cases no further dressing will be required; if, however, the canes show signs of falling off in vigour in June, July, or August, then a light dressing of a good cane manure, or of nitrate of soda or sulphate of ammonia should be given. A very important point gained by the early manuring of the cane with suitable manure is, that by so doing the healthy growth of the young plant, upon which the future crop so much depends, is ensured, and if a drought ensues in March, April, May, and June, it will be found that such plants will withstand its effects much better than the unmanured ones. A most important point, also, and one which I can scarcely impress upon you too strongly, is the very great mechanical improvement in the condition of the soil produced by pen manure and by vegetable green manures. The soils heavily manured with these become much more retentive of moisture, which is a most valuable property in our climate, whilst the addition of the very large proportion of organic matter contained in the manures increases the amount of humus in the soil; and, as the activity of the nitrifying organisms present (both those which oxidise ammonia into nitrates, so preparing it for plant food, and those which possibly occasion the assimilation of the free nitrogen of the air), depends in great measure upon the amount of this substance present, which apparently acts as food for them, the importance of such increase is evident.

Next we will consider the selection and application of the artificial manure to be given in June, July, or August. As at this period of the year the cane has well developed its roots, and is in a state of very active growth, we require a much more soluble and active manure than that used at an earlier period. It should contain rather a high proportion of nitrogen in a readily available form, either as ammonia salts, nitrates, or very easily decomposable organic matter. I am not inclined to lay much stress upon the form of the nitrogen applied at this season, as at the temperature of this island and in fairly wet seasons nitrification ensues with great rapidity, and the ammonia salts are thus rapidly converted into nitrates, whilst the organic substances are rapidly decomposed and in turn undergo nitrification. So called organic nitrogen is frequently recommended for application at this period, as to some extent reducing the chance of loss of nitrogen by drainage; but if we recollect, even under favourable circumstances, organic substances in decomposing lose nearly 30 per cent. of their

SAMPLES OF DUNDER.

	No. 1	No. 2	No. 3
Water	94·050 ..	92·230 ..	90·000
<i>a</i> Organic Matter	5·030 ..	7·400 ..	8·270
Silica	·019 ..	·020 ..	·218
Sulphuric Anhydride ..	·061 ..	·037 ..	·096
<i>b</i> Phosphoric Anhydride ..	·005 ..	·006 ..	·198
Carbonic Anhydride	·225 ..	·051 ..	·233
Chlorine	·118 ..	·036 ..	·178
Lime	·168 ..	·059 ..	·488
Iron peroxide	— ..	·061 ..	·047
Alumina	— ..	trace ..	trace
Magnesia	·040 ..	·033 ..	·084
Potash	·226 ..	·060 ..	·103
Soda	·058 ..	·004 ..	·085
Copper oxide	— ..	·003 ..	trace
	<u>100·000</u>	<u>100·000</u>	<u>100·000</u>
<i>a</i> Containing Nitrogen ..	·028 ..	·024 ..	·054
<i>b</i> Equal to Tricalcium			
Phosphate	·011 ..	·013 ..	·431
No. 1.—Dunder from molasses, value per puncheon			23 cts.
No. 2.—Dunder from rotten cane juice, value per puncheon			18 cts.
No. 3.—Dunder from molasses, skimmings, and cane mud, value per puncheon			36 cts

nitrogen in the free state, we shall perceive that the amount that may be saved by reduced washing and drainage is probably less than the amount thus lost. I do not consider that at this period of the canes' growth any great chance of the nitrates, formed or added, being washed in the soil below the range of its roots exists, where the manures are scientifically applied, unless under very exceptionable circumstances, and I believe that the experience of most of our planters will bear me out in this statement. The manure should contain a fair proportion of phosphates and potash, one with a larger amount of the latter being chosen if the earlier manuring has not supplied it. In selecting the manure great attention should be paid to the fineness of its particles and their intimate state of admixture, as well as to the complexity of its composition; the regular and equable distribution of the manurial plant food at this season being of the very greatest importance. Avoid the mistake of throwing the manure into the cane bunch. It is useless there, nay, even injurious, until it has been washed into the surrounding soil. The young cane roots, by the extremities of which absorption of plant food alone takes place, are now away from the middle of the bunch, and are finding their food in the banks of the holes.

My next statement will, I expect, be received by the majority of you with incredulity; it is that in this island we more frequently over-manure our canes (with artificial manures) than under manure them. Artificial manures have two classes of opponents; the first, a feeble one, those who do not manure at all; the second, a much more numerous one, those who over manure. You put to your canes at one dressing, say, 5 cwt. to the acre of Mr. A's manure. It does not give you as good a result as 3 cwt. per acre of Mr. B's, and you immediately jump to the conclusion that Mr. A's is not so good or so suitable a manure as Mr. B's, whilst the fact is that in the first case you have added so much soluble matter to your soil at one time that your canes cannot assimilate it; the soil water becomes too concentrated for the plant, which is thereby weakened and rendered liable to disease. Luckily, perhaps, a heavy rain comes and washes the excess away; your canes show signs of recovery, and you merely state that Mr. A's manure has scorched them. You do not notice the money loss you have inflicted upon the estate by over manuring, but ask your attorney, if he is a good natured one, to give you a little nitrate of soda or sulphate of ammonia to touch them up with—truly a case of "a hair of the dog that bit you."

Chemical or artificial manures must at all times be applied with the greatest care. They should, preferably, be first thoroughly mixed

EXAMPLES OF A MANURE OF COMPLEX COMPOSITION.

Detailed composition of "Dissolved Peruvian Guano," "Ohlendorff's"
800 tons, ex. "*Mary Hogarth*."

Soluble in cold water.

Moisture	9.058
Sodium Chloride	1.540
<i>a</i> Potassium Chloride	1.305
<i>b</i> Potassium Nitrate .....	.085
<i>c</i> Potassium Sulphate	2.639
Magnesium Sulphate	4.464
<i>d</i> Monocalcium Phosphate	15.570
<i>e</i> Ammonia Sulphate	30.341
<i>f</i> Organic Matter .....	.348

Soluble in Ammonium Citrate, Sp. gr. 1.09.

<i>g</i> Tricalcium Phosphate	2.217
Iron peroxide .....	.368
Calcium Sulphate	20.235
Magnesia .....	.172
<i>h</i> Potash .....	.055
Silica	1.138
<i>j</i> Organic Matter	2.402

Insoluble in Water and Citrate.

Tricalcium Phosphate .....	.571
Iron peroxide .....	.107
Magnesia .....	.027
<i>k</i> Potash .....	.024
Silica	5.329
<i>l</i> Organic Matter	2.005

100.000

<i>d</i> and <i>g</i> equal to Assimilable Phosphates	22.847
<i>a</i> , <i>b</i> , <i>c</i> , <i>h</i> and <i>k</i> total Potash	2.367
<i>a</i> Contains Nitrogen .....	.011
<i>e</i> " "	6.440
<i>f</i> " " .....	.170
<i>j</i> " " .....	.636
<i>l</i> " " .....	.157

a, *e*, *f*, *j*, and *l* contain total Nitrogen 7.414
Equal to Ammonia 9.00

with two or three times their bulk of dry earth, so as to facilitate their uniform application and distribution, and should be used in comparatively small quantities, say 2 cwt. at a time. You will get a far better return by applying any good artificial manure in two dressings of 2 cwt. each than in one of five, and you will have the additional advantage of saving some 12s. to 15s. per acre in the cost of manure. You may object that it will cost more to apply manure in two dressings than one. I reply that in this island labour is cheaper than manure; and would remind you that the Bridgetown Water Works Company do not pay you for the nitrates (invaluable to you, useless to them), which, by your system of manuring at one time far beyond the requirements and assimilating power of your plants, you send into their water supply.* I am somewhat inclined to recommend in many cases the substitution of dressings of sulphate of ammonia, or of nitrate of soda, for any second dressing of chemical manures at this season, but have not yet had sufficient experience of its results to speak with certainty upon it.

I do not think that there are any further points in connection with the manuring of the sugar cane to which I could with advantage draw your attention so late in the evening, and will therefore ask each one of those present to assist in working out this manurial problem by at once criticising this paper and giving the meeting the advantage of their own experience. Let us all join in attempting to improve the scientific cultivation of the sugar cane, so that by the time we have Central Factories we may have larger and richer crops for them to reap; and last, but not least, that by being better able to compete with the beet root we may restore her former prosperity to this island.

* During the earlier months of the year the Bridgetown Water Works Company's water contains an average of 5.14 parts per million of nitrogen as nitrates, and during the months from July to December, immediately after the manuring season, 8.70, an increase of 3.56 parts per million. This means, for the Company's supply 87lbs. nitrogen, equal to 435lbs. of sulphate of ammonia lost daily, and if we assume that this supply represents as much as one-twelfth of the water lost from the island by drainage, we get a loss equal to that of 5,220lbs. of sulphate of ammonia daily from July to December, as against 3,084lbs. from December to July. Of this extra loss of, in round numbers, one ton per diem, much is doubtless due to overmanuring, and to the wasteful practice of naked fallow.

NOTES ON BOOKS.

“THE MOST EFFECTIVE AND PRACTICAL MEANS OF AMELIORATING AND EXTENDING THE AGRICULTURAL AND PRODUCTIVE CAPABILITIES OF JAMAICA” (being the Essay to which was awarded the Prize by the Council of the Jamaica Society of Agriculture and Commerce), by W. Bancroft Espeut, F.L.S.. Kingston, 1886.

It is not a difficult task to set forth the thing as it is; but it is a different matter to propound practical remedies for existing evils. It is well, and necessary, to keep before the public the injustice and absurdity of the bounty system adopted by European Governments, with a view to its abolition; but to do nothing else is foolish—“Whilst the grass is growing the horse may be starving.”

Mr. Espeut in his “Essay” is not content with setting forth the thing as it is, but, as a practical man and one resident in Jamaica, points out the remedy.

The first “want” is one which, unfortunately, is not confined to Jamaica, namely, available capital.

Upon this point Mr. Espeut says:—

“One great want in Jamaica is, undoubtedly a Land Bank; a place where a man, owning land, who can obtain the requisite labour to work it, may go and obtain, expeditiously and with certainty, such a reasonable sum of money as he can prove conclusively will yield a good return if wisely expended on the soil, and at less cost and trouble than eight per cent. interest per annum, by means of a ninety day acceptance. Such an institution may not yield to the shareholders such large dividends as 14 per cent. per annum; but every £500 placed in the soil, by the aid of a Land Bank, under judicious selection and management, would increase Jamaica’s wealth to a larger extent than £1,000 obtained, as money must now be obtained, from the Colonial Bank.”

The local capitalist confines his loans to security upon houses in Kingston and other towns, and not upon land, which is the only security which most of the agriculturalists are able to offer.

“To furnish capital is then an effective means of ameliorating our present condition. Is it a practical means? I think so. Why should not the State, in Jamaica as in Ireland, advance money to landowners, to enable them to effect permanent improvements of value? It has been done in other British colonies and countries. Take British Guiana for example. The Government of that colony advanced £40,000 at three or four per cent. interest, to the owner of an estate, to enable him to construct a sea wall to

protect his land and land belonging to others, from the inroads of the sea. Why should not the Government of Jamaica advance money in the same way, to landowners requiring, for example, to construct an irrigation system, in order to convert dry and at present useless, idle land into productive land? The sum advanced might be less than half, or even a third, of the value of the land. The Rio Cobre Irrigation Works, instead of being a burden to Jamaica, would either have become a blessing and reproductive, under the system I advocate, or would not have been built at all. Take another instance, a landowner may possess fertile land, which he cannot use because it is situated far from a shipping place. Money lent on the security of that land, to improve the means of transporting and shipping the produce of the soil, would be a fair and legitimate work for the State to perform. If the Government took the initiative, and it was known that a man, possessing land, could procure from the Government money, needed for the permanent improvement of his estate, societies, like our valuable and prosperous building societies, would speedily come into existence, and instead of lending a man money to build a house, they would lend him money to build a fortune. I remember many said that the building societies would never succeed—but they have succeeded, and done an immense amount of good. Some say now that Agricultural Loan Banks—on the same lines as these building societies would never succeed. I say ‘try them.’ The Credit Foncier of Mauritius has done more to permanently benefit that island than anything else: why should not similar facilities secure similar results in Jamaica? There is capital in Jamaica which, if distributed to those who can employ it to advantage, will probably suffice for some time to come. But, at present, this capital is not available to the community for the production and creation of new wealth out of Nature’s gifts—climate and soil—because it exists, either in the shape of large sums, accumulated in the hands of a few individuals, or it is present in very small sums in the hands of a vast number of persons. It is an old adage: ‘He that hath most lends least.’ The large capitalist is satisfied with four per cent. from Jamaica Government Debentures, because his interest, though small, is secure, and is receivable without entailing on him any trouble. The money in the hands of the multitude is in sums which are too small to be of use, in themselves, in the business of creating wealth out of the soil, therefore it finds investment in the Savings Bank or in the Colonial Bank, at three per cent., and, like the money of the large capitalist, instead of being available for the work of continuing the cultivation of our soil—our one only source of wealth—it is taken out of the fructifying stream, and is locked up in an iron safe! Is it surprising that agriculture should languish, and that trade should be depressed? I submit, then, that one certain effective and practical means of ameliorating and extending the agricultural capabilities of Jamaica is that the scattered wealth of the island should be collected and redistributed, under proper safeguards, to those who are able to extract further wealth, by the aid of capital, from the soil. This is not the time, nor the place, to sketch the details of such an undertaking; but let it once be recognised that money can be as safely loaned on land, for the growth of crops, as it is now loaned for the growth of houses—and that the former

class of growth will add more than the latter does to the national store of wealth—and I am satisfied that agricultural loan societies will be as successful as the building societies have been and are.”

The labour difficulty in Jamaica is next dwelt upon—with reference to this Mr. Espeut says:—

“With regard to the second prime agent—labour—Jamaica is as badly situated as it is with regard to the other prime agent—capital. We have no schools for training the old or the young in the best systems of agriculture. We have no schools, and now that apprenticeship has practically died out, no means of teaching the trades and handicrafts. We have no industrial schools to teach the best ways of curing our products or utilising the vast natural store of valuable raw materials. Year after year the old tradesmen die out, none as competent as them take their place, although we live in times when almost every day adds something to our knowledge of what each trade requires, and should do, to attain perfection. In our agricultural industries, the old boilermen, distillers, ploughmen, ditchers, speyers, stone-wall masons, herdsmen, headmen who know their work, and others, are dying out and none so competent as they are to be found to supply their places. The most valuable of our effective labour is that comprised in the now small, and ever diminishing number of old time people, *who were personally instructed by those who knew the thing they taught*. The coming generation, and the bulk of our population, know nothing, because they have had neither teachers nor teaching. Is this not cause enough for the decay of our agricultural and productive industries? I submit, therefore, that one effective means of ameliorating and extending our capabilities is to be found in the re-organisation and instruction of our labour supply. Is it a practical means? I think it is. In Barbados and other Colonies, in the Mother Country, in almost all prosperous and civilised countries, the relations of employer and employed are clearly defined by law, readily understood, and easily enforced. But in Jamaica it is the reverse, the Master and Servants’ Act is practically obsolete, and is an absurd and useless law.”

Of the industries, the first place is given to sugar, which was at one time the staple article of the island. Mr. Espeut strongly advocates the Central Factory system. He says:—

“If it is to survive the death struggle in which it is engaged with the beet root industry, it can only do so by altering the methods heretofore in use. It is useless for each separate estate to go on trying to compete with the gigantic cane sugar Usines, or Central Factories, of the other sugar Colonies, which alone are fitted to take effective part in the battle for life now raging. There are a few estates, perhaps, which are so extremely well situated, in regard to soil, climate, abundance of fuel, and ample water supply for power and irrigation, that they can grow, and manufacture sugar so cheaply as to compare favourably with the best results obtained at Usines—but they are the exceptions, which prove the rule—and I only wish they were more numerous than I believe them to be. The quality of Jamiaca sugar

is so very fine, naturally, owing to its freedom from salts and its good polarization, that we have a great advantage over many sugar-growing countries in that respect; and another material advantage exists in our excellent geographical position near to the great market, the United States. These, added to the greater advantages we enjoy, over all other places, in the superiority of our rum, must enable Jamaica to compete favourably with other places, *if only we provide ourselves with the same perfected appliances for the most economical manufacture of sugar, which exist elsewhere.* This can only be achieved by the erection of Central Factories or Usines, placed in the best positions of the best sugar-growing districts. There are many most excellent sites for Central Factories; I may name a few of them.

The stations he recommends for Central Factories are: The Plantain Garden River District, Salt River, in Vere, and the Caymannas and Bushy Park.

The producers of rum are regarded for the most part, Mr. Espeut tells us, as “duffers,” by men of science:—

“Rum comes next to sugar, and is its natural and necessary accompaniment. The extraordinarily high price obtained by some estates for rum known as ‘German Rum’—because it all goes to Germany—to impart to neutral beet root spirit, out of its great abundance, the flavour and smell of true rum—has not attracted the attention it deserves. Men of science have always regarded Jamaica sugar planters as ‘duffers,’ because all the estates do not make a rum of equal value to that produced by a few. They have argued, I think correctly, though I know others don’t agree with me, that what can be done on one estate can be done on all, if the like conditions are present.

“Nothing demonstrates the folly of our forefathers, and indeed of ourselves, more than this German rum question. We have never employed practical scientists to find out the cause of the extraordinary difference in the prices of first-class German rum and of an ordinary rum. I have seen the one sell at 11s. the gallon—the other at 2s. 6d. the same day in London. This enormous difference is a standing slur on the intelligence and enterprise of our sugar planters; and our Government, too, is censurable for not having, long since, directed the island chemist to devote every moment of his spare time to the elucidation of the apparently mysterious difference between the one class of rum and the other. So far, the quantity of rum made of this high quality has been produced accidentally, as I never met any one who could give any explanation of the cause or effect. Some say it is the soil—others the water—others again imagine that it is owing to the particular proportions of the various ingredients. Detesting, beyond everything, the taste and smell of rum, I have never been able to bring myself to that condition in which I could personally superintend any experiments to ascertain, accurately and certainly, the true cause—but I have, by microscopical investigation and otherwise, satisfied myself that it is possible, and indeed quite feasible, for every estate or central factory in Jamaica—and, for the matter of that, in any sugar-producing country of like temperature—to produce a rum, of identical quality and value as that of the most highly-prized brand—because the value depends on a ‘body’ or ‘flavour’ or ‘per-

fume,' which is obtained, not by any skill of man, but simply and solely, in consequence of the presence, in the wash, of a particular ferment or germ, differing, in its odour and effects, from that present in other classes of rum. The researches of Pasteur, of Dumas, Astier, Bichat, Leibig, Berceus, and Engel, and a host of other great men have carefully determined the various ferments, and the fungi which produce them, in the manufacture of beer and of different wines; but no one has ever studied the organic living cells which produce fermentation in our distilleries, which are, undoubtedly, the causes of the flavour of our rums. . . . I therefore think that the sugar interest, and the Government of Jamaica, should at once direct the attention of the Island Chemist, Mr. Bowrey, F.C.S., to this important subject, and give him the services of an assistant, conversant if possible with this branch of study in order that the particular ferment of German rum may be clearly ascertained and identified, with the view of its being utilised for the conversion of ordinary cheap Jamaica rum into the highly-prized and costly German rum. I hope that this suggestion will not be put on one side as a mere theory, but that its value will be shortly demonstrated."

Of the "fruit" trade in Jamaica, which of recent times has made such strikes, the writer says:—

"I have left the fruit industry to the last because I think it is destined to be the greatest of all Jamaica's sources of wealth. When we remember that within four or five days' steaming there is the United States, with over fifty millions of the most intelligent and active of mankind, it is astonishing how little we have done to make the most of our advantages. The fruit industry has grown from nothing, without any aid or encouragement from Government. From an export value in 1873 of only £4,745, it increased to £252,836 in 1884! Fifty fold in eleven years! There is no reason why it should not grow another fifty fold in the next eleven years, if the requisite facilities are furnished. But no further material increase can be expected unless railways or tramways, or wire ropeways, are constructed, to provide transport for the fruit; the labour and land, available now, cannot be expected to accomplish impossibilities; and there is no doubt that the trade has encroached on the means now available, and that much valuable fruit is destroyed, or rendered unsuitable for shipment, owing to the long distances that have to be overcome, in the transport, on men's and women's heads, and on mule and horseback, and in carts and in boats, before it finally arrives on the steamer's decks. Whilst Costa Rica, Honduras, and even St. Domingo are busy building railways to transport their fruit, Jamaica hangs back, because some people are afraid that an industry which has reached a quarter of a million sterling in a dozen years, in face of immense difficulties, will not endure and increase sufficiently to render railways remunerative. Others are afraid of increasing our paltry Public Debt in order to obtain so beneficial an investment for their money. The table annexed, marked A, shows the debt, per head of population, in each of the countries named. It shews that Jamaica has a wide margin for investing money in railways, and that we are far behind in this most needed direction. We are being left behind rapidly in the race for wealth, because we go on carrying on our heads burdens which

in other countries are carried by rails. It is a wonder that we do not realise the amount of labour—human and animal—which is now daily wasted in performing duty in the transportation of fruit, which could be much more cheaply performed by steam, with the greater advantage, too, that the labour saved by railways would be available for increasing the quantity of our exports, instead of, as now, reducing their money value. So long as Jamaica refrains from building railways for the encouragement of the fruit and other industries, because it will be necessary to raise money by loans to pay the cost, so long, I say, we are acting as the wicked servant in the Parable did, who instead of putting out to interest his master's money, hid it in a napkin. I cannot understand the theory which prevents the colony borrowing funds, which can be invested to advantage; and to postpone further railway construction until we ascertain the results, from a pecuniary point of view of the recent puny railway extension, is, I think, to confess that we are not able to understand the position of the island and of its only advancing industry. For want of railways much of our fruit leaves our shores stale, bruised, and battered—our planters are deterred from extending their cultivation by the risk which now attends the shipment and transport of their fruit; and many thousands of tons of energy are wasted in conveying, instead of being well-spent in producing, the article. Our fruit is admittedly the finest flavoured, and the best reaping, which reaches America, but, for want of railways, it is shipped when stale and is bruised in transport. The only article for which there is any demand is grown and exported under difficulties which no good Government would permit to continue, when the remedy is so easily applied. It comes to this, that because Jamaica is Jamaica, that which is beneficial and sound policy elsewhere is bad and unsound here. Are we to allow such a monstrous idea to prevail to our injury?"

And in order to successfully develop this trade tramways are a necessity.

"In order to ameliorate and extend the fruit industry it is essential that railways or tramways, or wire ropeways, should be constructed in districts possessing no certain or sufficient means of transport. Let this be once recognised and we shall get railways. Let this continue to be ignored and we shall not get railways. Let this continue to be ignored and we shall lose our fruit trade, as we have lost our sugar and coffee trades. It is also essential that fruit should be included among the articles enumerated in the schedule of the "Agricultural Produce Buyers' Law. Until this is done the grower of fruit must remain at the mercy of petty thieves; and petty larceny bears more cruelly on fruit growers than on any other class of the community."

We give Mr. Espent's conclusion upon the whole question in his own words.

I. CAPITAL.—By means of Land Banks, or societies on the lines of the Building Societies.

II. TRAINING SCHOOLS.—To educate our orphans, criminal, and vagrant children in all branches of industry, and to be available as stations for the

purchase and preparation of coffee, cacao, annatto, and other similar products, now shipped in a badly prepared condition; and as stations where the breed of every kind of animal can be improved by new blood; where bee culture, and the management of small stock, and the preparation of food stuffs can be taught and practised.

III. CENTRAL FACTORIES for sugar making.

IV. RAILWAYS for feeding the sugar factories with canes, and for the conveyance of fruit and other produce with regularity, despatch, and economy. It will be wise to foster and encourage industry by giving all possible facilities for transport. These railways should be constructed at once—the longer they are delayed, the longer will be delayed that period at which we shall be in a position to start in our advance forward. We have waited long enough to see other countries, not possessing our advantages, beat us; and we should not be kept waiting any longer. If the Government are not prepared to extent their present railway system in order to supply the additions needed, capitalists should be invited to open up new lines where they are needed, by the offer of a guaranteed interest on a specified cost per mile. If the guarantee of 4 per cent. per annum for 20 years were offered, capitalists would as willingly supply us with railways, as they have supplied India on similar terms.

“Let Jamaica be supplied with the facilities enjoyed by other countries, and there is little real ground to fear that her sons will be found wanting or unable to take a fair place in the march of progress and civilisation, and in the race for honour and wealth.”

The following table A shows the debt per head of the population of Jamaica, as compared with that of nine other of our colonies. We wish Mr. Espeut had enlarged this table, by including those colonies where the debt per head was less than in Jamaica, as for instance, Barbados:—

A.					
	Debt per Capita.		Excess per Capita over Jamaica.		Balance in favor of Jamaica.
	£		£		£
Jamaica	2·14	....	0·0	....
Mauritius.....	2·32	....	0·18	....	110·352
Trinidad	3·33	....	1·19	....	691·156
Cape	10·61	....	8·48	....	4,844·417
Victoria	26·00	....	23·86	....	13,857·983
N. S. Wales.....	19·07	....	17·93	....	10,413·815
W. Australia	11·88	....	9·74	....	5,657·030
Tasmani	17·31	....	15·17	....	8,810·796
S. Australia	40·00	....	37·86	....	21,989·239
Queensland	62·03	....	58·89	....	29,557·116

PATENT OFFICE INQUIRY.*

Report of the Committee appointed by the Board of Trade to inquire into the Duties, Organization, and Arrangements of the Patent Office under the Patents, Designs, and Trade Marks Act, 1883, having special regard to the System of Examination of the Specifications which accompany applications for Patents now in force under that Act, together with Minutes of Evidence, Appendices, &c.

This is the Report of the Committee appointed by the Board of Trade to inquire into the system of examination of the specifications of patents. The Committee held their sittings during the earlier part of the year 1886, and they report as follows:—

“One of the most important questions engaging our attention has been the working of the provisions contained in section 7, sub-section 5, of the Act of 1883.

“That section requires that if after an application has been made, but before a patent has been sealed, another application is made bearing the same, or a similar title, the examiner shall report to the Comptroller whether the specification appears to him to comprise the same invention as the earliest application. And if he reports in the affirmative, it further requires that the Comptroller shall give notice to the applicants that the examiner has so reported.

“We recommend that sub-sections 5 and 6 of section 7, and the corresponding provision in section 11, should be repealed.

“The hardship complained of, that the office should receive fees from a subsequent applicant whilst there was a prior application pending which would render the subsequent application and any patent granted upon it valueless, might be met by providing that in case the second applicant choose to abandon his application, and the patent (if any) granted upon it within a certain period, say two months of the grant of a patent on the first application, he should receive a return of the fees paid by him to the office.

“We believe that if such a provision existed, the return of fees thus applied for would be quite trifling in amount.”

After a recommendation with a view to utilising more fully the office staff, the Committee go on to say:—

“Serious complaints have been made to us of the working of that part of the Act which permits amendments when the application does

* For a summary of the “New Patent Bill, 1883,” see the volume of the *Sugar Cane*, for 1883, page 509.

not, in the first instance, comply with the requirements of the Act. It has been stated that when an examiner has reported that the invention has not been fairly described and that an amendment is necessary, the applicant occupies months sometimes in making such amendments, and it is alleged that advantage has been taken of this power to introduce into a specification, objected to on account of its vagueness, matters the knowledge of which has been subsequently acquired, it may be even from a subsequent applicant who has meantime filed his complete specification. We think these complaints are to some extent well founded, and that, at all events, there is a risk of abuse from an indefinite time being allowed for amendments. At present there are no means of controlling the applicant in this respect. The amendment may be made at any time prior to the date for delivering the complete specification. We are of opinion that there is no sound reason why the time should be thus unrestricted.

“We therefore recommend an alteration in the law to the effect, that if an amendment be required by the Comptroller under section 7, sub-section (1), then unless an amendment making the application conformable to the requirements of section 6 be made within one month, the patent should date only from the time of the original application.

“To meet exceptional cases, however, we further suggest that power should be given to the Comptroller (subject to the usual appeal) to extend the time beyond one month when it is proved that the delay was unavoidable and arose without default or neglect on the part of the applicant. It is worthy of consideration whether public notice should not be required of any such application for extension of time, and whether any subsequent applicant who has filed a complete specification should not be permitted to oppose it.

“Witnesses have called our attention to the practice of the office with reference to rejecting applications on the ground that they contain more than one invention. It has been alleged that too much strictness has been observed in the interpretation of what constitutes ‘one invention.’ There may have been at one time some ground for complaint that the view taken by the office was too rigid. But we think that this is not at present the case. It is conceded that the strictness complained of has been relaxed since the instructions given by the law officers in April, 1885, and it was stated by so important a representative of inventors as Sir William Thomson that the principle laid down in those instructions was quite satisfactory.

“Strong representations have been made to us in favour of the

creation of a roll of patent agents. It is said that there are persons calling themselves patent agents who possess neither the requisite knowledge or integrity, and that occasionally inventors who are poor, and not highly educated, suffer seriously in consequence. Some witnesses urged that if a roll of duly qualified agents were created, the Patent Office should be permitted to deal only either with the inventor himself or with an agent on the roll. We cannot recommend such a regulation, and we think it would be undesirable to put the right of communicating with the Patent Office in the hands of any body of men, or to create a monopoly in respect thereof. The matters upon which the office has to communicate with inventors are sometimes of a character quite untechnical, and it would be a hard measure to prevent an inventor in the provinces from transacting his business with the office in such cases through the agency of a friend residing in London. And we do not see our way to distinguish in an enactment between cases of this nature and those requiring technical knowledge, even if we thought it desirable to create a monopoly in favour of agents on the roll.

“We think, however, that it would be of public advantage to provide a means of securing a roll patent agents consisting of duly qualified persons, the admission to which should be possible and easy for all persons so qualified. With this object we would suggest that steps should be taken with a view to fixing a standard of qualification for the title of patent agent. And it might perhaps be well to enact that any person should be subject to a penalty who without being on the roll assumed the title of patent agent either by advertisement or by description on his place of business or on any documents issued by him.

“Various other changes in the present system have been suggested by witnesses we have examined, some of them amounting to a complete revolution of the law as at present administered. But there has been no general concurrence of opinion in favour of any of these changes. They have met with as much opposition as support from the non-official witnesses. And we think that in any view a further trial of the present law is necessary before a fundamental change could be recommended.

“If the law and its administration should be altered in the manner we have proposed, we would suggest the expediency of appointing another committee after sufficient time has elapsed to afford experience of the working of the office under the altered circumstances.”

PHILIPPINE ISLANDS.

LOW PRICES AND THE CULTIVATION OF SUGAR.

In a report upon the trade and industries of the Philippine Islands, the British Consul at Manilla states that owing to the steady decline in the prices of sugar last year, many planters were seriously contemplating the abandonment of the growth of sugar cane, and the substitution of coffee, maize, and tobacco. The unprofitableness, through low prices, of their regular industry was not, however, the only cause of this intended change. Last year heavy losses were occasioned by the ravages of locusts, which appeared in great clouds, and inflicted immense damage upon the canes. Altogether, therefore, the economical condition of the Philippines is not just now at all encouraging, the planters having for the most part realised little more from their last crops than sufficient to pay the cost of cultivation. They are consequently able to, expend very little upon foreign imports.

THE EXPORT BOUNTY ON GERMAN REFINED SUGAR.

The raw sugar used by the German refiners yields at least 90 per cent. of refined sugar. The duty paid by the refiner on the raw sugar (*i.e.*, the difference between the export price and the duty-paid price) is 18 marks per 100 kil.

The drawback on refined exported, if it is only to return the duty paid on the raw out of which the refined is made, should therefore not exceed 20 marks, the proportion of refined to raw being as 9 to 10.

The present drawback is 22·20 marks, and therefore causes a loss to the Treasury of 2·20 marks on every 100 kil. of refined exported.

In October of this year the drawbacks are to be reduced, but as the reduction is to be the same on each drawback the proportions are altered (as occurred in the previous reduction made in 1883), and the drawback on refined becomes still more excessive as compared with the duty on the raw sugar.

The duty on raw (*i.e.*, difference between export price and duty-

paid price) will then be 17·25 marks, and drawback on refined 21·50 marks. The correct drawback (in the proportion of 10 to 9) would be 19·16 marks. The new drawback will therefore cause a loss to the Treasury of 2·34 marks on every 100 kil. of refined sugar exported.

This loss to the Treasury, arising from the drawback on refined sugar, is *in addition to* that which arises from the duty being charged on the roots.

DIVIDENDS OF RUSSIAN SUGAR FACTORIES.

The following information respecting the dividends paid by various sugar manufactories in Russia in the year 1887 as compared with the preceding seven years has been received from Sir R. B. D. Morier, Her Majesty's Ambassador at St. Petersburg, under date of the 22nd March last:—

Manufactories.	Years.							
	1887.	1886.	1885.	1884.	1883.	1882.	1881.	1880.
	%	%	%	%	%	%	%	%
Yaropovitchi	5	10	15	30	25	25	20	25
Gorodok	6	8	20	25	25	—	19	30
Krasnoselkovsk ..	—	10	12	12	—	—	—	—
Strogonoff	6	10	30	35	—	—	—	—
Spitchinetsky	6	6	20	25	32	25	20	15
Romanovsky	2½	9	15	12	30	30	17	—
Gonorovsk	5	12	20	20	15	8	8	9
Shedrovsky	6	12	30	30	30	23	20	20
Djurinsky	—	6	15	20	30	30	16	20
Khodarkovsk	—	15	20	35	30	25	15	10
Charnomirsk	—	11	10	35	30	25	15	10

“The following manufactories have paid no dividends this year: Tsibulevsk, Karovitse, Levashovo-Voitovetsky, Ivankovetsky, Turbovsk, Zagnilkovsk, Krasnosilovsk, Strikhovetsky, Stepanovsk, Severinovka, Krasnoselkovsk, Levada, and Makharipetsk.”

Correspondence.

A BILL TO ABOLISH SUGAR BOUNTIES.

Carpenter's Road, Stratford, London, E.,

19th April, 1887.

TO THE EDITOR OF THE "SUGAR CANE."

Sir,—Most politicians admit the existence of a serious grievance on the part of our sugar refiners against the system of foreign bounties, whilst they regret the absence of any practical remedy.

The proposition of a countervailing duty, which has been put forward as the only possible cure for the disease, does not, for various reasons, make many converts. Free traders feel that countervailing is perilously akin to protection, and protectionists fear that a measure which does not set the agricultural interest in the forefront is not one to make a good party cry.

The fact is, the idea of a countervailing duty confined to one article of commerce appears to be so selfish and narrow in its application, that it does not excite much real sympathy outside the circle of those who have invested their money in sugar refining. Nevertheless, the subject is one of immense importance to the country, even if we only regard the decay of our sugar refineries as an example of the facility with which foreign Governments may crush out all our industries one after the other. To-day it is the turn of sugar, to-morrow it may be that of cotton or wool or iron. My view of the matter is, that merchandise introduced into this free trade country, by means of a bounty, is in reality as much contraband as tobacco or brandy which are "run" without paying the duty—one is the evasion of the spirit, the other an evasion of the letter, of the law.

Looked at from this point of view, it seems to me possible to adopt such a line of opposition to bounty-fed merchandise of all kinds as will unite both free traders and protectionists in a policy which would effectually protect our industries against bounties without offending any susceptibilities or imposing any duties.

I have thrown my views into the shape of a bill to be presented to Parliament, which I append. I fear some defects may be discovered in the form of the document, as I have no experience to guide me in such matters, but as the central idea appears to be a sound one, I

invite criticism on it from those who have made this question a special study.

I am, Sir, your obedient Servant,

EDWARD H. O'NEILL.

A BILL TO ABOLISH FOREIGN BOUNTIES.

Whereas, the tendency of modern legislation in Great Britain has been in the direction of freeing foreign trade from impediments, thereby exposing home manufacturers and producers to the competition of foreign manufactures and products, and whereas, within the period of the adoption of the said policy by Great Britain, certain foreign Governments, with the view of transplanting certain British industries to their own soil, have deliberately adopted the system of giving bounties or subsidies to merchandise intended for export, directly in the form of grants of money, or indirectly in the form of excessive drawbacks, and whereas, the said system of State aid tends to defeat the free trade policy of Great Britain, to injure and destroy the business of British and colonial manufacturers and producers, and to subvert the principle of the most favoured nation clause in treaties with foreign nations, it is hereby enacted :—

1. That from and after the 1st day of January, 1888, entry into the ports of the United Kingdom of Great Britain and Ireland is prohibited to all merchandise which has received from any foreign Government any bounty or subsidy, or excessive drawback, or other State aid, directly or indirectly.

2. All merchandise so subsidised shall be confiscated, and treated as contraband, the penalties and fines in such case made and provided being applicable to offences under this Act.

3. It shall be accepted as sufficient proof that merchandise is entitled to entry if the importer thereof shall produce a certificate from the shipper, stating that the merchandise in question has not received any bounty or subsidy, or excessive drawback, or other State aid, either directly or indirectly.

Such certificate shall be declared before a British Consul, and must bear his endorsement that to the best of his belief the statement is true.

Such certificates shall only be required in the case of suspected articles, which the Comptroller of H.M. Customs may from time to time specify.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
 Fel.Inst. P.A., Patent Agent, 6, Lord Street, Liverpool; 6,
 Bank Street, Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

4397. H. W. WALKER and T. L. PATTERSON, Glasgow. *Improvements in apparatus for moulding and refining sugar.* 24th March, 1887.

4889. T. TOMLINSON, London. *Apparatus for trashing and cutting sugar cane and such like crops.* 1st April, 1887.

5066. A. SEYBERLICH and A. TRAMPEDACH, London. *Improvements in or relating to the manufacture of grape sugar.* 5th April, 1887.

ABRIDGMENTS.

15400. J. HORNUNG and C. RABE, Sangerhausen, Prussia, and F. J. WEISS, Basle. *Improvements relating to evaporating apparatus for use in the manufacture of sugar and for similar purposes.* 25th November, 1886. This invention consists in automatically regulating the pressure on the various pans worked on the multiple effect system, and consists in causing the steam from each pan in succession to pass in a worm through the next and enter a column of water at a higher point than the last did; the respective differences of the heights of column regulate the respective pressures.

1938. T. DERHAM, Bolton, Lancashire. *Certain improvements in hydrometers and saccharometers.* 10th February, 1886. This invention consists in regulating the weights of poises in saccharometers according to a given algebraical formula.

AMERICAN.

ABRIDGMENT.

357481. J. H. HANCOCK, Yonkers, New York. *Vacuum evaporating apparatus.* 8th February, 1887. The inventor provides a cylindrical vacuum vessel, surrounded circumferentially by a water-jacket for the circulation of hot water, so that a uniform and readily controlled heat of the desired temperature may be applied to all sides of the fluid or mass to be evaporated, and connects with such jacket supply-pipes for hot and cold water and steam, and an exhaust or overflow pipe. The evaporating cylinder is also provided with a central longitudinal shaft, having a connected spiral agitator and a

longitudinal scraper-blade, arranged to scrape the entire inner periphery of the cylinder, whereby fluid and semi-fluid substances may be so agitated as to prevent cohesion or agglutination into an unmanageable mass, and be readily brought to a powdered or granular condition.

360581. A. GAUKROGER, San Francisco. *Screen-bottom for charcoal washing and filtering tanks.* 5th April, 1887. This invention relates to a screen-bottom to be used in connection with the tanks in which the charcoal used for purifying purposes in sugar-houses or elsewhere is washed and filtered. It consists of a suitably shaped casing, having fine perforated or other screen material upon its upper and lower surfaces, and in combination with this a filling of coarse sand or fine gravel introduced into the bottom of the screen and between these surfaces.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

JAVA SUGAR EXPORTS.

FROM 1ST JULY, 1886, TO FEBRUARY, 1887.
(For Exports previous to July, 1886, see next page.)

Tons Shipped to end of.	To Europe.	To other Countries.	Total.
July, 1886	9,657	4,339	13,996
August ,,	28,101	7,933	36,034
September ,,	72,193	18,250	90,443
October ,,	108,007	25,784	133,791
November ,,	141,956	38,264	180,220
December ,,	179,191	55,208	234,400
January, 1887	216,607	65,496	282,103
February ,,	226,415	74,570	300,985

Shipments to the United Kingdom only, January to December.

1882	149,274	1884	162,683
1883	169,839	1885	185,434

JAVA SUGAR EXPORTS, JULY, 1880, TO JUNE, 1886.*

Tons Shipped till the end of	1st July 1880—30th June, 1881.				1st July, 1881—30th June, 1882.				1st July, 1882—30th June, 1883.			
	To Europe.	To other Countries.	Total Shipments.	Per cent. of Total.	To Europe.	To other Countries.	Total Shipments.	Per cent. of Total.	To Europe.	To other Countries.	Total Shipments.	Per cent. of Total.
July	1,098	888	1,986	1-14	6,891	1,365	8,256	3-08	10,599	915	11,514	4-10
August	7,595	4,815	12,410	6-34	27,163	3,558	30,721	11-48	39,488	3,521	43,009	15-30
September	25,719	11,322	37,041	18-93	58,932	6,924	65,856	24-61	74,283	7,566	81,849	29-20
October	41,911	17,394	59,305	30-30	95,657	13,059	108,716	40-63	108,719	12,182	120,901	42-78
November	65,254	19,692	84,946	43-40	127,227	18,654	145,881	54-52	144,521	13,524	158,045	56-03
December	99,930	25,763	125,693	64-22	150,024	20,685	170,709	63-80	179,500	17,801	197,301	70-39
January	113,966	33,331	147,297	75-21	172,568	23,854	196,422	73-41	203,851	19,245	223,096	79-60
February	128,308	38,086	166,394	85-12	197,506	27,680	225,186	84-16	209,747	23,148	232,895	83-09
March	140,778	41,028	181,806	92-89	209,605	30,625	240,230	89-79	224,364	23,861	248,225	88-56
April	148,368	43,119	191,487	97-83	223,723	32,465	256,188	95-75	237,219	25,198	262,417	93-63
May	150,440	43,293	193,733	98-47	225,885	33,406	259,291	96-91	248,461	27,088	275,549	98-31
June	151,538	44,481	195,719	100-00	232,776	34,771	267,547	100-00	252,299	27,969	280,268	100-00

Tons Shipped till the end of	1st July, 1883—30th June, 1884.				1st July, 1884—30th June, 1885.				1st July, 1885—30th June, 1886.			
	To Europe.	To other Countries.	Total Shipments.	Per cent. of Total.	To Europe.	To other Countries.	Total Shipments.	Per cent. of Total.	To Europe.	To other Countries.	Total Shipments.	Per cent. of Total.
July	15,814	770	16,584	5-38	14,150	1,191	15,341	4-07	17,789	915	18,704	5-66
August	38,862	4,590	43,452	14-05	33,398	6,213	39,611	10-51	48,890	1,830	50,720	15-39
September	77,361	6,333	83,694	27-20	63,074	9,879	72,953	19-37	122,546	2,610	125,156	37-92
October	116,935	6,767	123,702	40-20	111,120	19,187	130,307	34-60	180,780	5,980	186,760	56-59
November	169,536	7,722	177,258	57-63	169,248	26,508	195,756	51-98	233,580	6,115	239,695	65-80
December	207,427	11,584	219,011	71-18	218,929	30,541	249,470	66-25	257,733	11,535	269,268	74-17
January	234,055	15,030	249,085	80-95	250,157	39,603	289,760	76-94	286,948	11,913	298,861	82-27
February	247,378	17,841	265,219	86-19	277,514	48,160	325,674	86-48	310,701	15,177	325,878	89-71
March	258,212	19,932	278,144	90-33	295,625	52,317	347,942	92-39	324,214	19,424	343,638	94-60
April	265,127	21,846	286,973	93-26	305,329	55,880	361,209	95-91	333,087	21,931	355,018	97-73
May	274,631	24,106	298,737	97-09	309,541	60,668	370,209	98-31	333,638	25,187	358,825	98-78
June	283,155	24,535	307,690	100-00	313,842	62,738	376,580	100-00	335,862	27,382	363,244	100-00

* For Exports since June, 1886, see opposite page.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO MARCH 31ST, 1886 AND 1887.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1886.	1887.	1886.	1887.
	Cwts.	Cwts.	£	£
Germany	928,875	1,709,340	663,414	921,046
Holland	65,756	76,473	48,684	42,460
Belgium	276,401	337,025	188,534	171,594
France	2,819	1,552	1,647	938
British West Indies & Guiana	655,723	731,284	581,195	544,838
British East Indies	115,765	66,021	65,741	29,105
China and Hong Kong	44,226	12	26,393	6
Mauritius	22,652	22,077	15,129	10,120
Spanish West India Islands	—	—	—	—
Brazil	265,000	223,519	185,842	117,867
Java	1,640,059	1,062,397	1,326,708	704,824
Philippine Islands	149,179	47,202	90,350	20,316
Peru	220,578	122,037	168,404	75,160
Other Countries	173,379	162,471	128,684	95,827
Total of Raw Sugars ..	4,560,412	4,561,410	3,490,725	2,734,101
Molasses	20,764	33,422	8,622	9,741
Total Raw Sugars	—	—	3,499,347	2,743,842
REFINED SUGARS.				
Germany	363,832	564,753	321,878	437,842
Holland	220,118	333,023	204,246	260,618
Belgium	25,238	37,010	24,882	31,126
France	143,653	318,977	138,890	237,896
United States	350,646	185,797	319,646	149,937
Other Countries	507,379	64	429,975	37
Total of Refined	1,610,866	1,439,624	1,439,517	1,117,456

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	31,902	21,306	23,161	11,933
Belgium	12,515	13,131	9,548	8,166
France	17,822	16,737	13,970	10,147
Portugal, Azores, & Madeira	28,755	28,638	22,058	16,275
Italy	13,129	28,185	9,696	16,828
British North America	1,519	4,877	2,676	2,802
Other Countries	93,427	79,768	75,349	52,618
Total	199,069	192,642	156,458	118,769

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of March compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1884, 1885, and 1886, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	" LUMPS AND LOAVES."						" OTHER SORTS." Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.						
	Monthly Average.			Mar.			Monthly Average.			Mar.			Monthly Average.			Mar.			
	1884	1885	1886	1887	1885	1886	1887	1884	1885	1886	1887	1884	1885	1886	1887	1884	1885	1886	1887
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France.....	2737	2035	1462	1155	2431	1343	1003	1621	546	2688	4161	664	1018	3669	4358	2581	4150	5316	4672
Holland	3560	4247	3508	3835	3778	2825	4769	1948	1555	1428	1715	1766	967	2272	5528	5802	4936	5550	7041
Germany & Austria ..	552	956	990	1406	978	573	1253	2380	2859	6634	8006	3970	4811	11393	2932	3815	7624	9412	12646
Belgium	183	214	344	351	195	450	325	151	116	113	265	116	90	393	334	330	457	616	718
United States	962	722	854	455	647	2159	1010	3386	10654	5078	2641	8883	5719	6440	4348	11376	5932	3096	7450
Russia .....	..	..	..	..	..	..	..	..	..	3412	1	..	4852	3	..	..	3412	1	3
Other Countries .....	..	..	..	..	7	..	..	121	12	9	..	..	..	..	121	12	9	..	..
Total	8014	8174	7158	7202	8036	7350	8360	9607	15742	19362	16789	15399	17457	24170	17621	23916	26520	23991	32580

SUGAR STATISTICS—GREAT BRITAIN.

TO APRIL 23RD, 1887 AND 1886. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1887.	1886.	1887.	1886.	1887.	1886.
London	76	117	93	85	92	111
Liverpool ..	84	100	79	76	87	77
Bristol	3	5	19	18	18	15
Clyde	49	85	68	65	81	83
Total ..	212	307	259	244	278	286
	Decrease.. 95		Increase.. 15		Decrease.. 8	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. TO MARCH, 1887 AND 1886.

	STOCKS.		DELIVERIES.		IMPORTS.	
	April 1st.		In March.		In March.	
	1887.	1886.	1887.	1886.	1887.	1886.
New York	69	67	86	68	81	82
Boston	12	11	19	18	18	21
Philadelphia	1	1	14	10	14	11
Baltimore . . . . .	..	..	..	..	..	..
Total	82	79	119	96	113	114
	Increase.. 3		Increase.. 23		Decrease.. 1	
Total for the Year	—	—	271	252	251	273

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, April 14th, 1887.

FAIR REFINING.	960/o CENTS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
Apr. 14, 1887.—4 9-16c.	5½c.	5¾c.	5¾c.	Jan. 1, 1887—102,279 tons.
Apr. 15, 1886.—5 1-16c.	5¾c.	6¾-7-16c.	6-6 1-16c.	Jan. 1, 1886— 57,328 tons.
Apr. 16, 1885.—4 9-16c.	5½c.	5 15-16c.	5½c.	Jan. 1, 1885— 89,186 tons.
Apr. 17, 1884.—5¾c.	6 5-16c.	7c.	6¾c.	Jan. 1, 1884— 60,900 tons.
Apr. 19, 1883.—6 15-16c.	7¾c.	8¾c.	8¾c.	Jan. 1, 1883— 50,297 tons.
Apr. 20, 1882.—7½c.	8 9-32c.	9¾c.	9½-¾c.	Jan. 1, 1882— 43,927 tons.
Apr. 21, 1881.—7½c.	8½c.	9 7-16c.	9-9½c.	Jan. 1, 1881— 66,999 tons.
Apr. 15, 1880.—7¾c.	8 9-16c.	9¾c.	9-9½c.	Jan. 1, 1880— 63,558 tons.
Apr. 17, 1879.—6½c.	7½c.	8½c.	7¾-8c.	Jan. 1, 1879— 50,773 tons.
Apr. 18, 1878.—7½c.	8 5-16c.	9¾c.	9-9½c.	Jan. 1, 1878— 48,230 tons.
Apr. 19, 1877.—9¾c.	9 15-16c.	11¾c.	11-11½c.	Jan. 1, 1877— 25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST MARCH, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France. Holland		German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
201	215	60	269	136	24	905	995	955

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST MARCH, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France. Holland		German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
1195	499	51	383	185	346	2659	2528	2488

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP,
OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1886-87.	1885-86.	1884-85.	1883-84.
	Tons.	Tons.	Tons.	Tons.
France.....	500,000 ..	298,407 ..	308,410 ..	473,676
German Empire ..	1,012,500 ..	838,131 ..	1,154,817 ..	986,402
Austro-Hungary....	525,000 ..	377,032 ..	557,766 ..	445,954
Russia and Poland ..	475,000 ..	537,860 ..	386,433 ..	307,696
Belgium	95,000 ..	48,421 ..	88,463 ..	106,586
Holland and other				
Countries.....	50,000 ..	37,500 ..	50,000 ..	40,000
Total.....	2,657,500	2,137,351	2,545,889	2,360,314

These figures are the same as those given last month. Mr. Licht makes no alteration in his present estimate.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The slight improvement in the market for raw sugar, which we noted a month ago, has been maintained.

The statistical position, both in this country and in the United States continues strong, and yet the market may be said to be without animation, buyers still buying from hand to mouth. Some confidence is placed in the figures showing the stocks in this country and in the United States, but this is wanting in those of the Continent, more especially Germany; for four years now the exports from Germany have exceeded the estimates, and it is therefore argued quite probable that this will be the case in 1887. This is the explanation why many adhere so strictly to confining their purchases to absolute requirements.

German beet 88% f.o.b., which a month ago was 11s. to 11s. 1½d., is now 11s. 7½d. to 11s. 9d.; and 11s. 9d. is quoted for new crop, October-December.

Not much change to report in the market for refined.

The imports of American refined were in March 7,450 tons, and for the three months 1887, 9,289 tons, against 17,532 tons for the corresponding three months of 1886.

On the 23rd April the deliveries in the United Kingdom showed an increase of 17,179 tons as compared with 1886, and the imports a decrease of 7,302 tons.

The stocks in the United Kingdom at this date were 211,522 tons, against 307,953 tons in 1886, or a reduction of 96,433 tons.

Present quotations for the standard qualities, as under, are:—


FLOATING.		Last Month.
Porto Rico, fair to good Refining	11/9 to 12/-	against 11/3 to 11/6.
Cuba Centrifugals, 96% polarization	12/6	„ 12/6
Cuba Muscovados, fair to good Refining..	11/9 to 12/-	„ 11/3 to 11/6.
Java, No. 14 to 15, good to strong	13/6 to 14/-	„ 13/6 to 14/-.
LANDED.		Last Month.
Madras Cane Jaggery.. .. .	8/6 to 9/6	against 8/3 to 8/9.
Manilla Cebu and Ilo Ilo	8/6 to 9/6	„ 8/6 to 8/9.
Paris Loaves, f.o.b.	14/9 to 15/3	„ 14/9 to 15/3.
Titlers	17/-	„ 17/-
Tate's Cubes.. .. .	19/-	„ 18/9
Austrian-German Beetroot, 88% f.o.b. ..	11/7½ to 11/9	„ 11/- to 11/1½

THE SUGAR CANE.

No. 215.

JUNE 1, 1887.

VOL. XIX.

 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

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A meeting in connection with the Sugar Bounties' Association was held at the Westminster Palace Hotel, on the 24th of May. Several members of Parliamentary Sugar Bounties Committee were present. It is understood that Mr. Baden-Powell will move for further correspondence on the subject, and that arrangements will be made with a view to a debate upon it in the House of Lords.

We learn that Messrs F. Silvester & Co., of the Castle Hill Works, Newcastle, Staffordshire, have just shipped a consignment of Mining Machinery to Australia. The firm sent out a consignment last year, which on its arrival was found to be of such a satisfactory character that the order was at once duplicated.

They are now engaged upon orders for similar work for India.

We are informed, says *The Times* of May 13th, that Messrs. Carvalho Brothers and Co., of St. Mary Axe, find it necessary, on account of recent losses sustained by them, to ask the indulgence of their creditors. Their books have been placed by them in the hands of Messrs. Turquand, Youngs, and Co., who will prepare and submit a statement of their affairs at an early date. The solicitors of Messrs. Carvalho are Messrs. Druces and Attlee, 10, Billiter Square. The firm of Messrs. Carvalho is an old-established one of 50 years' standing, and has been compelled to take the above course owing to losses in the West Indies.

“X. Y. Z.” writes to the *Grocer*, in reference to a statement which appeared in that paper respecting the removal of the business of Messrs. A. Gibbs & Sons from Bristol, as follows:—

“The falling off in business in Barbados sugar in Bristol has not been due to any absence of demand or lack of competition on the part of local refiners, but mainly to the fact that the West India merchants at this port, have of late years refused to sell to the refiners at a price that would leave even the smallest margin of profit. In some cases, after refusing to sell, they (the merchants) have realized at values 30 to 40 per cent. below those originally bid by the local refiners. These latter are, as others of their contemporaries, much handicapped by the excessive imports of American and other refined sugars, which are slowly ruining what was formerly a most important industry in Bristol, and seriously affecting the general employment of labour at this port.”

We gave last month (page 229) the first part of a paper on the average expenses and production of a Cuban Central Sugar Factory. We now give (page 317) the concluding portion. In the present part we have given the profit and loss account of a year's crop, which will be read with interest by many of our planters. The production of sugar and molasses was 38,320 cwts. The apparent profit was £799, without allowing anything for interest on capital. If the interest account at 6 per cent. is included, this profit of £799 is converted into a loss of £2,459, or about 1s. 3d. per cwt. The price obtained for the centrifugal sugar, 96 per cent., was 11s. 8d. per cwt. in Cuba. There is also given the cost of obtaining by a planter, of *good financial standing*, a temporary advance of \$30,000, which shows it to be a somewhat expensive operation.

The mutual agreement entered into by the Russian sugar manufacturers is, that the contracting parties shall export, within a fixed time, 25 per cent. of their production for the year 1886-87, according to the individual assessment, to which they have all assented. That for the years 1887-88, and 1888-89, the excess of their production over the quantities of their individual assessments shall also be exported under certain restrictions as to white sugars, and the representatives of the contracting parties are instructed to restrict, or, if necessary, entirely to suspend the obligatory export for any of the three periods,

whenever the price of "sand sugar" shall be quoted on the Kieff Exchange as high as $4\frac{1}{2}$ roubles per pood on the spot.

Mr. Licht in his circular of 13th May, in speaking of the contemplated changes in the German sugar duties, and their mode of levying them, says: "The proposed new law on sugar duties sent in to the Federal Council, includes a tax on beets of 50pf. per cwt., and a drawback on export of 5 marks per cwt. of sugar, along with the introduction of a tax on consumption of 5 marks per cwt. on all sugar passing into use in Germany. According to the results of last year's working, this system of taxation, supposing the cost of collection, &c., to be the same, would give the following figures, which also contain those of the current year for the sake of comparison:—

	Present mode of levying the tax, viz., 85pf. per cwt. of beets and 9 marks drawback per cwt. of sugar exported.		Government pro- posal, viz., 50pf. tax on beets, 5 marks on consumption, and 5 marks drawback on export.
Receipts from the tax on beets ..	141,000,000	....	83,000,000
Tax on consumption .....	.....	....	40,000,000
	<u>141,000,000</u>		<u>123,000,000</u>
Deduct drawback on 12,000,000 centners sugar exported.....	108,000,000	....	60,000,000
	<u>33,000,000</u>	....	<u>63,000,000</u>
Leaving	33,000,000	....	63,000,000
Deduct cost of collection	6,000,000	....	6,000,000
	<u>27,000,000</u>		<u>57,000,000</u>
Net yield	27,000,000	against	57,000,000

Calculating 8·2 cwts. of beets to 1 cwt. of sugar, the tax per cwt. of sugar is 7m. 05pf., against 4m. 15pf.

And the excess on that exported is 1m. 95pf., against 0m. 85pf. Consequently, the manufacturer must obtain in the open market 1m. 10pf. more than at present to prevent loss from the proposed alteration in the duties."

CHANCERY OF THE ORDER OF ST. MICHAEL AND ST. GEORGE,
Downing Street, May 24th.

The Queen has been graciously pleased to give directions for the following promotions in, and appointments to, the Most Distinguished Order of St. Michael and St. George:—

TO BE ORDINARY MEMBERS OF THE FIRST CLASS, OR KNIGHTS GRAND CROSS OF THE SAID MOST DISTINGUISHED ORDER :—

General Sir John Lintorn Arabin Simmons, G.C.B., Governor of the Island of Malta.

General Sir Henry Wylie Norman, K.C.B., C.I.E., Captain-General and Governor-in-Chief of the Island of Jamaica.

Sir Henry Brougham Loch, K.C.B., Governor of the Colony of Victoria.

Sir William Cleaver Francis Robinson, K.C.M.G., Governor of the Colony of South Australia.

TO BE ORDINARY MEMBERS OF THE SECOND CLASS, OR KNIGHTS COMMANDERS OF THE SAID MOST DISTINGUISHED ORDER :—

The Right Honourable the Earl of Onslow, Parliamentary Under-Secretary of State for the Colonies.

The Right Honourable Viscount Gormanston, Governor of the Leeward Islands.

James Hector, Esq., M.D., C.M.G., Director of Geological Surveys and Curator of the Colonial Museum for the Colony of New Zealand.

William Brandford Griffith, Esq., C.M.G., Governor of the Gold Coast Colony.

Lieutenant-Colonel John Terence Nicolls O'Brien, C.M.G., Governor of the Island of Heligoland.

Colonel Frederick Carrington, C.M.G., Commandant of the Police Force of British Bechuanaland.

John Bates Thurston, Esq., C.M.G., Lieutenant-Governor and Colonial Secretary of the Colony of Fiji.

TO BE ORDINARY MEMBERS OF THE THIRD CLASS, OR COMPANIONS OF THE SAID MOST DISTINGUISHED ORDER :—

Thomas Kerr, Esq., Governor of the Falkland Islands.

Henry Arthur Blake, Esq., Governor of the Bahama Islands.

Walter Joseph Sendall, Esq., Governor of the Windward Islands.

James Shaw Hay, Esq., Administrator of Her Majesty's Settlement on the Gambia.

Captain John Charles Ready Colomb, R.M. Art., M.P., for services in connection with Colonial Defence.

Paul Frederick Tidman, Esq., for services in connection with the Straits Settlements.

Major Henry Edward McCallum, R.E., Colonial Engineer and Surveyor-General of the Straits Settlements.

Guiseppe Carbone, Esq., LL.D., Crown Advocate of the Island of Malta.

Captain George Sydenham Clarke, R.E., Secretary to the Colonial Defence Committee.

William Alexander Baillie Hamilton, Esq., Secretary to the Colonial Conference.

SUGAR.

INCREASED CONSUMPTION, DIMINISHED SUPPLY, AND YET NO
IMPROVEMENT IN PRICES.

The extraordinary position of stocks and visible supply of this article, in conjunction with the enormous consumption, appear not at all in harmony with the present current prices, both in this country and continental markets. Even the prospect of a favourable result from the crop which may now be considered as progressing, does not seem, under the most prosperous circumstances, to warrant the present depression.

At page 335 we give Mr. Licht's estimate for 1887-1888, and the crops for 1886-1887 and two previous years.

The figures given by *Die Deutsche Zuckerindustrie* are substantially the same. They are as follows:—

	1887-88.	1886-87.	1885-86.	1884-85.
Germany	1,000,000 ..	1,012,500 ..	838,105 ..	1,154,817 tons.
Austria	475,000 ..	550,000 ..	369,000 ..	654,000 ,,
France	575,000 ..	490,000 ..	298,407 ..	308,410 ,,
Belgium	100,000 ..	92,000 ..	48,420 ..	88,460 ,,
Holland, &c..	55,000 ..	50,000 ..	37,500 ..	50,000 ,,
Russia	420,000 ..	455,000 ..	526,200 ..	386,433 ,,
	<u>2,625,000</u>	<u>2,649,500</u>	<u>2,117,633</u>	<u>2,642,120</u> ,,

From the above, therefore, it is pretty clear that the new crop is not likely to give us an overwhelming supply; and, in conjunction with this, we have to take into consideration Mr. Licht's statement of 21st May, giving full proof, by reliable figures, that the increase in the consumption of all kinds of sugar, in Europe and America, amounts to 275,000 tons this season, *i.e.*, for twelve months ending the 30th April; and for Europe alone, 173,000 tons.

In further proof of large and increased consumption, we must not omit to pay attention to the following observations translated from *Deutsche Zuckerindustrie*, of 13th inst.:—

The published figures reported yesterday regarding the export of sugar during the month of April, again show a large excess over the preliminary entries; the latter were given at 56,385 tons raw, and 16,610 tons refined, while the quantities actually exported amounted

to 63,479 tons, and 21,922 tons respectively, making a total excess of 12,406 tons, which have to be considered as an extra reduction on the figures given respecting stocks.

On the whole, it appears that our (German) export from the 1st August, 1886, amounts to 407,868 tons raw, and 121,161 tons refined, against 275,001 tons raw, and 53,581 tons refined during the corresponding period of the previous season. The excess altogether amounts to 200,867 tons, but it would be more correct to estimate the refined sugar as representing a larger figure if calculated in the raw state, when the amount of excess will be 207,000 tons, which is more than the extra quantity produced this season over that of the previous season, and taken from the Imperial German Customs Returns, after the perusal of which, we cannot feel surprised regarding the enormous reduction of stocks in Germany, as published in Mr. Czarnakow's *Circular*, of 20th May. It will be as well to notice the very large reduction of stocks in France and our own country.

The visible supplies according to latest dates are as follows in the different countries:—

	1887. Tons.		1886. Tons.		1885. Tons.
United Kingdom, 14th May	211,649	..	311,847	..	302,726
France, 1st May	188,032	..	239,771	..	219,156
Germany, 1st May (Licht) (provisional)	172,000	..	239,694	..	202,000
Austria and Hungary, 1st May (Licht)	109,400	..	33,300	..	57,250
Holland, 1st May	56,560	..	36,167	..	42,964
Belgium, 1st May	34,423	..	32,900	..	62,564
	<u>772,064</u>	..	<u>893,679</u>	..	<u>886,660</u>
Cargoes afloat to Europe	96,647	..	116,902	..	108,945
	<u>868,711</u>	..	<u>1,010,581</u>	..	<u>995,605</u>
United States, 19th May, Total Stocks	206,000	..	182,102	..	195,660
Havana and Matanzas, 13th May....	117,000	..	126,469	..	104,217
Total	<u>1,191,711</u>		<u>1,319,152</u>		<u>1,295,482</u>

The Stock in Hamburg now amounts to 62,500 tons, against about 12,700 tons; and in Dantzic, 12,748, against 22,311 tons last year.

	1887. Tons.		1886. Tons.		1887. Tons.
According to Görz, the German stock amounted, on 1st May ap- proximately, to.....	261,900	..	424,000	..	373,800

We may further refer to the statement of *Die Deutsche Zuckerindustrie* of the same date referring to visible supply:—

MARKET.	DATE.	End of March.					
		1887.	1886.	1885.	1887.	1886.	1885.
Germany.....	1. 5.	261,900*	424,000	373,200	373,200	496,000	447,200
Austria	1. 5.	190,400	178,000	246,700	231,900	223,700	294,500
Great Britain..	15. 5.	211,849	311,847	302,726	203,333	304,240	291,116
France	30. 4.	188,034	240,570	219,156	202,496	259,070	234,611
Holland (Rb)..	1. 5.	57,573	31,845	42,964	61,757	40,798	47,038
Belgium	1. 5.	33,758	21,102	62,564	44,035	37,300	77,617
Afloat	14. 5.	92,508	92,993	139,531	97,413	83,255	152,281
Arrived	14. 5.	8,980	21,574	6,150	11,057	27,924	11,345
United States..	18. 5.	137,000	127,300	137,123	84,750	79,509	101,493
Havana and Matanzas. }	30. 4.	105,000	114,424	77,944	99,181	89,948	65,129
Total					1,409,122	1,642,744	1,722,330
* Approximately..			End of February.		1,592,578	1,706,697	1,759,007

It will strike the attentive reader that the two statements, regarding visible supply, differ very materially, which, however, is easily explained by the fact that Mr. Licht's figures regarding stocks in Germany and Austria refer solely to quantities held in store and for sale, while Mr. Goerz (*Die Deutsche Zuckerindustrie*) embraces all that is held by dealers and refiners; at any rate, it appears from the former's calculations, that there is now a deficiency in the available supply for the market of 127,441 tons as against last year; and from the latter's accounts the deficiency, in all hands, amounts to the enormous quantity of 286,653 tons as against last year.

Surely the trade in general cannot shut their eyes to this remarkable state of things, and yet dealers and refiners are apparently going on from hand to mouth, and the wonder is, that speculators do not step in, especially when value of money is merely nominal. It ought not to be overlooked that prices of beet root sugar are uncommonly low at 11s. 9d. and 12s., when, in the year 1885, with the largest crop ever known of and heavier stocks, the value rose to 16s. 3d.

The relative prices of the present and former years are:—

1887.	1886.	1885.	1884.
f.o.b., 11/7½ to 11/9	.. 12/-	.. 16/1½ to 16/3	.. 15/3

French No. 3 in Paris.

32 fr. 37½	36 fr. 37½	46 fr. 25	47 fr. 50·75
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CUBAN EXPORT DUTY ON SUGARS.

From a Correspondent.

In the *Sugar Cane*, of April 1st, an article was published about the export duties exacted at Cuban custom houses on sugars. It was stated that the ruling tariff exacted 40 cents per kilogramme on dry sugars and 35 cents on damp sugars, and some remarks made on the absurd policy followed by the Spanish Government on such an important matter.

Now it is necessary to add, that since the 15th March, the Government has made a change on the sugar tariff, by deducting 20 per cent. from the same, equivalent to 48 cents per hhd. of sugar; or, in other words, dry sugars now pay 24 cents per 100 kilogrammes, and damp sugars 21 cents; molasses pay $9\frac{3}{4}$ cents.

This change, ordered by the Queen Regent, was made at the request of the Minister of the Colonies, Senor N. Balaguer, who was induced to so doing by prominent Cuban planters and merchants.

But it must be mentioned, that though such a measure gives some relief to the Cuban sugar industry; it, by no means, fulfils the aims and wishes of the community.

The petition from the Cuban planters and merchants to the Home Government asked for the complete abolition of the export duty on sugars. But it seems that the Minister of the Colonies thought that Cuba asked for too much from the Government, and he placed before Her Royal Majesty, the Queen Regent, a decree allowing a reduction of 20 per cent. from the Cuban sugar tariff.

Yet, it seems that the Cuban sugar interest feel by no means satisfied with the doings of the Home Government on the subject, and insists upon having the complete abolition of the export duty on sugars. At such an attitude, the Minister of the Colonies has offered to submit to the circumstances, by striking out from the Cuban Budget for 1887 to 1888 the export duty on sugars. The Budget has not yet been made out or approved by the Spanish Congress, but it will be pretty soon, as it should be ready to begin to rule on the 1st July.

Such is the actual condition of affairs in regard to the export duties on sugars at the Island of Cuba.

ON THE GERMAN SUGAR DUTIES.

From the *Deutsche Zuckerindustrie* and the *Deutsche Tageblatt*.

Mr. Ferdinand Knauer writes in the *Deutsche Zuckerindustrie* respecting the question of the sugar duties, that two years ago he had maintained that the law then and still existing could not continue, as the Finance Minister would not submit to the deficit which must inevitably result from it. He now says:—"We maintain unconditionally, in the face of all the new projects that are being brought forward, and making full allowance for the position, the assertion which we then made, that nothing but the tax on consumption pure and simple could be of any permanent avail in helping the industry and the imperial treasury."

He then enumerates the three projects which have been mooted, and declares that none are of any certain practical effect, and that they would all result in a similar dead-lock to the present one, and finally declares:—

"There is only one scheme with regard to sugar taxation, which is both clear and simple in its application and execution which would afford permanent security to the industry and to agriculture, and bring in about 50 millions a year with certainty to the empire, at the same time raise the German sugar refinery to great prosperity, protect the works which extracts sugar from molasses, and permitting the free working of every kind of manufacture, would, with a perfectly simple method of supervision, render fraud nearly impossible,—and that is the introduction of a genuine (pure and simple) tax on consumption, such as we proposed years ago under something like the following conditions:—

"1. The regulations respecting sugar taxation, heretofore existing, are annulled, the sugar factories are free from taxation, and pay no duties, excepting the industrial tax and the local rates.

"2. The sugar passing into consumption to be subject, at the place where it goes into the hands of the dealer, to a duty of 8, 9, and 10 marks per centner of 50 kilos., according to quality; such duty to be paid by the refinery which sells the sugar, which is to have credit for the sums in question.

"3. All raw sugar to go into the refineries under bond, unless the beet sugar manufacturer is also a manufacturer of sugar fit for consumption, in which case he is classed among the refiners.

"4. On all sugar sent abroad the exporter to receive, according to quality, an average of 2 marks per centner as a premium on labour in a Government certificate, payable in three months."

"5. The existing raw sugar manufactories to be assessed at a fixed rate (contingentirt), according to their present extent; new manufactories to require a Government concession. (We will show later on that this contingent assessment is not absolutely necessary to the national interest.) Any imported sugar to pay duty as heretofore.

"No further legal provisions are necessary, and it is only needful to draw up these five articles in paragraphs, and there you have the legislation required."

The *Deutsche Tageblatt* contains a letter, which, while declaring that all premiums on export are economically false and evil in their effects, and that whether considered as a question of political morality, or of the permanent interest of the country, these premiums must be abolished. The writer proposes to lay a tax on alcoholic liquors, and so to regulate this tax and the duty on sugar that the following results may be secured:—

1. The abolition of premiums on export.
2. The protection of the agricultural interests from any damage at the outset, and the permanent security of a large profit to them in future.
3. The attainment of an increased revenue to the Government.
4. The compensation of the taxpayer by a corresponding relief.

The arrangement consists on the one hand in abolishing the sugar duty, and on the other in introducing a tax on spirits, and doing away with the premiums on export.

The consumption of sugar in Germany is susceptible of an enormous increase. In England and America it is about 30 to 40 kilos. per head, in Germany only 8 kilos. Accurate statistics are scarcely possible. The legislation proposed would favour the increase in the consumption of sugar, which, when untaxed, is one of the cheapest foods known, and restrict the consumption of spirits. The State would suffer a loss of 20 to 30 million marks by the abolition of the sugar duty, but there can be no doubt the tax on spirits might be made to yield from 100 to 200 million marks.

(It is noteworthy that this journal is in close relations with official circles.)

* No one has any doubt whatever that our industry cannot compete in the open market without premiums; the legislator has therefore to make his choice between premiums and the ruin of the German sugar industry.

CUBA SUGAR MARKET.

Expressly for the *Sugar Cane*.

Havana, April 20th, 1887.

SUGAR IN BOXES.—The amount received from the country during the year, is the same quantity marketed the past year to this date—36,000 boxes regardless of quality or colour. For the last two years, only Havana receives sugars in boxes, if Cardenas is excepted, as her sugar refinery ships a little of her refined sugar packed in boxes. Nearly all the sugars packed in boxes go to Spain, and whatever does not, is mostly used up for local consumption.

“Derosne” or “Relieux” whites are quoted to-day :—

	Cts. per lbs.	Rls. per @	Dols. per cwt.
“Fair” to “Good”	4½	9	5·04
“Prime” to “Choice”	4¾	9¾	5·46

Clayed—purged in moulds :—

Common, No. 12 D.S.	2½	5½	2·87
Fair „ 13 to 14	2¾	5½	3·08
Good „ 15 „ 16	3	6	3·36
Prime „ 17 „ 18	3½	7	3·92
Choice „ 19 „ 20	3¾	7¾	4·34

Coguchos—mould’s bottoms :—

Common, No. 6 to 7 D.S.	1¾	3½	1·96
Fair „ 8 to 9 „	2	4	2·24
Good „ 10 „ 11 „	2¼	4½	2·52

SUGAR IN BAGS.—For the last two years, nearly all the centrifugal, or clarified and centrifugal, molasses sugars made on the Island is packed in bags. The majority of the empty bags coming from England. It is regrettable that the manufacturers have not met to agree on a standard size, as it is most inconvenient to have them to hold from 275 up to 350 lbs. They should all be made to hold uniformly 300 lbs. net. At this date, stock of sugars in bags amounts at the warehouses to 280,000 bags, and since January 1st, 790,000 bags. This is 65,000 bags more than up to same date the past year.

Quotations to-day stand as follows :—

Clarified—vacuum pan—

	Cts. per lbs.	Rls. per @	Dols. per cwt.
No. 10 D.S., pol. 93 to 94°	2¾	4¾	2·66
„ 11 „ „ 95 „ 96°	2½	5	2·80
„ 12 „ „ 97 „ 98°	2½	5¼	2·94

Centrifugal molasses sugar—

No. 6 to 7 D.S., pol. 84 to 85°	....	$1\frac{5}{8}$	....	$3\frac{1}{4}$	....	1·82
„ 8 „ 9 „ „ 86 „ 87°	.. ..	$1\frac{3}{4}$	....	$3\frac{1}{2}$	....	1·96
„ 10 „ 11 „ „ 88 „ 89°	....	$1\frac{7}{8}$	....	$3\frac{3}{4}$	....	2·10
„ 10 „ 11 „ „ 90 „ 91°	.. ..	2	....	4	....	2·24

SUGAR IN HHDS.—In our days, the largest quantity of sugar packed in hhds. are muscovados, and the balance is centrifugal sugars.

As the price of an empty hhd. is much higher than five empty bags, it makes 3d. per lb. in the price of clarified sugar in favour of packing in bags. The large number of sugar plantations now making centrifugals, and the named convenience of packing in bags, has severely injured the coopering industry at home and abroad. Of course, muscovados must continue to be packed in hhds., as it would leak out if placed in bags.

The market rules to day:—

	Cts. per lb.	Rls. per @	Dols. per cwt.
Inf. to com. refining: No. 6 to 7 D.S., pol. 85° to 86°	$1\frac{3}{4}$	$3\frac{1}{2}$	1·96
Com. to fair refining: No. 8 to 9 D.S., pol. 87° to 88°	$1\frac{7}{8}$	$3\frac{3}{4}$	2·10
Fair to good refining: No. 10 to 11 D.S., pol. 89° to 90°	2	4	2·24
Good to prime ref'g.: No. 11 to 12 D.S., pol. 91° to 92°	$2\frac{1}{8}$	$4\frac{1}{4}$	2·38

MOLASSES.—In consequence of the many plantations now making centrifugal sugars, the bulk of the muscovado molasses made has fallen considerably. As molasses dealers would have to sell very cheap, or at a very unremunerative price, the centrifugal molasses they receive—called 3rds and 4ths—they mix all the molasses that comes from the country together, tending, by so doing, to turn out a fair boiling molasses, testing on an average 50°. For this class, prices have fluctuated during the month from $2\frac{1}{2}$, $2\frac{5}{8}$, $2\frac{3}{4}$, and $2\frac{7}{8}$ rls. per keg of $5\frac{1}{2}$ gallons at sea-boards. The stock at the warehouses is rather small, and as grinding is coming to a close next month, the stock will be still smaller.

GRINDING OPERATIONS AT A CLOSE.—Many sugar plantations have finished grinding operations, but up to about the 15th May, others will continue, weather not interfering. An accurate report on the total size of the crop realized cannot be made out before the 1st July. At any rate a guess is made out, according to which the crop will turn out about 100,000 tons of sugar *smaller* than that of the past

year. This means 600,000 tons of sugar, against 715,000 tons the previous year. The financial results of the present crop are more than discouraging. We have never seen lower prices, and several planters speak about folding up their arms, and of waiting to see what may develope.

ACTUAL CONDITION OF THE CUBAN SUGAR INDUSTRY.

It is a well known fact that, next to Germany, Cuba is the heaviest sugar producing country in the world. We do not take into account India, as her sugars do not affect the European or American markets.

In our days, the natural market for Cuban sugars is the United States. Whatever quantity she may manufacture, she will always find a ready market for her sugars in the United States. Her high graded sugars have always a good demand in Spain.

The Spanish Government has just reduced the export duty of sugars in Cuba 20 per cent., equivalent to 48 cents per hhd., or a net duty of \$1⁴²/₁₀₀ per hhd. Though goods exported from any country should be duty free, it must be acknowledged that the export duty at Cuba for her sugars is now exceedingly moderate. Funny to see that duties there are exacted by weight, without taking qualities into consideration. The tariff only recognises *dry* and *damp* sugars.

Slavery being abolished, the moderate sugar prices ruling at European and American markets have compelled planters to accept new methods and ideas for producing sugars successfully. We understand that many have adapted the central plantation sugar factory system, aided by improved machinery, but it remains to be seen, if it is an actual fact, that it gives in every instance the desired results.

During the present crop, the sugar producer in Cuba has or is fighting against two points, which he finds himself impotent to overcome. These are,—the high price at which he has to pay for the canes, and the high wages exacted by the labouring hands employed. With such two capital points against him, he cannot make the central plantation sugar factory system to turn out a complete success. We understand that, aided by special circumstances, many have made a success out of the system this year, but we also hear of others that have not been successful. At any rate, we insist that it is the system called to give proper satisfaction to all concerned, and that, in the

course of time, each and all the difficulties touched at present, will and must be overpowered.

It is a fact that the market sugar prices ruling during the present crop have never been so low, yet the Cuban central factory owner commenced grinding operations last December with enthusiasm, which has however been dying out, as he finds himself touching heavy losses and a gloomy final result.

On that date—December, 1886,—many enthusiasts had used all their power planting as much cane as possible, and if the past crop amounted to 700,000 tons sugar, they openly predicted, for this year, a crop of 850,000 tons. These lines are being written at Havana in the second fortnight of March, when it is widely reported from nearly all quarters in the Island, that the crop will be 20 per cent. smaller than last year, and several planters are speaking of winding-up operations at once, and letting the cane fields go to waste and stop expenses. And, to make it worse, it is reported that many of the fires, which are daily taking place at the cane fields, are of incendiary origin—started by the owner of the fields, who by so doing settles the payment of his debts for the present, compelling his creditors, by the force of circumstances, not to bother him during the rest of the present year.

The Spanish Government has been at work for some time trying to induce the United States to abolish or diminish her import duties on sugars, but, so far, unsuccessfully. Spain or Cuba has nothing to offer the United States to counterbalance the heavy loss that the United States Treasury would suffer by complying with the wishes of Spain or Cuba. At any rate, it is expected that the United States for self-convenience will, at an early date, diminish her import duties on sugars.

At present, no official statistics are carried on in Cuba by the Spanish Government, where a reliable statement of the condition of her agriculture could be perused ; consequently, the number of sugar plantations on the Island, their production, etc., has all to be collected from private information, all differing from each other. It is reported that very soon a bureau for the purpose will be established by the Government.

W. J. F.

BALANCE SHEET OF THE COMPANY TRADING UNDER
THE NAME OF "CARDENAS SUGAR REFINERY,"
ON THE 31ST JANUARY, 1887.

(Translation.)

ASSETS.	GOLD. Dollars.	BK. BILLS Dollars.
Reserved Stock Shares	200,000	
Properties:—		
Lands, quays, buildings, and in- stallations	\$441,042·32	
Tools, utensils and other items, for manufacturing purpose ..	40,519·03	
New constructions and install- ations	163,098·47	
Contracted Machinery:—		
Paid on Account	51,554·25	
	696,214·07	
Cash:—		
Amount on hand and in banks	2,836·66	1,626·18
Bills receivable	1,800	
Bone-black and Fuel:—		
Cost, expenses, and stock	49,575·37	
Cooperage:—		
Cost and expenses on stock, packages and coopered goods	16,705·06	
General Expenses:—		
Salaries, wages, insurance, commissions, brokerages, etc.	38,882·28	
Interest and discounts	396·36	
Consignments to Corresponsals:—		
Goods pending liquidation	398,006·14	
Cut loaf, machine privilege	12,090·70	
Raw Sugars:—		
Cost and expenses on purchases	269,439·80	
Exchange: on Bank Bills	\$1,626·28	671·74
	\$1,686,618	1,626·18

LIABILITIES.		GOLD. Dollars.	BK. BILLS Dollars.
Capital Stock		1,000,000	
Mortgages		11,327·80	
Bills payable		10,506·77	
Active Dividend, No. 1.....	\$832		
Do. do. No. 2.....	90,842		
		91,674·00	
Correspondals and account current.....		278,258·26	
Refined sugar	\$268,082·28		
Furbinated sugar	6,346·27		
Residues	667·15		
		275,095·70	
Profit and loss.....		2,201·33	
Reserved funds		17,554·32	
Exchange: on gold.....	\$671·74	....	1,626·18
		1,686,618·18	1,626·18
Sugar Stock on hand:—			
Raw sugars, 420 hhds., 1,428 bags, and 932 boxes		48,984	
Furbinated sugars, 313 bags		2,817	
Refined sugars, 1,052 bbls. granulated, 1,257 half bbls, 94 cubes, 21 half bbls, 94 bags, 558 boxes, 8 packages cubes, 11 half bbls. cubes.....		29,639	
Sugars in process of refining		13,500	
		\$94,940	

The Manager: S. DE LA VEGA.

The Accountant: P. J. BONDIX.

E. and O. E.—Cardenas, 31st January, 1887.

DIFFUSION TESTS.

THE YIELD OF LOUISIANA CANE AT FORT SCOTT.

An Analytical Review of Prof. Wiley's Figures—Why they are among the impossibilities, by Mr. W. P. Kirchoff.

Whatever be the advantages of diffusion over milling, one thing is patent, that the diffusion experiments at Fort Scott on the Louisiana cane brought about some wonderful results. Early in November last the phenomenal yield of 144 pounds of sugar per ton was the result of working 83.25 tons of cane. At that time nothing further of the experiments could be learned. Since then, however, Dr. H. W. Wiley's report on said experiments made its appearance. With it some interesting figures reveal themselves. In order to find out something more about that phenomenal yield, let us turn to page 53 of said report and ascertain how this yield was brought about. As the yield of sugar is the last step in the process, it will be best to commence at the beginning, and ascertain from how much juice this phenomenal yield was extracted.

On page 53, at the bottom of the page, the report mentions that the 83.25 tons of cane filled 86 cells or diffusers, and that 2,066 pounds of chips were in each cell; by referring to my copy of the work done at the diffusers on this lot of cane, I find that the figure 86 is not correct, but should be $78\frac{3}{4}$ cells, and that therefore 2114 pounds of chips were in each cell. On page 54 it is stated that the weight of juice drawn from each cell of chips was 1100 litres. Specific gravity $1.04 = 2516.8$ pounds; this figure, 2516.8 pounds, is also wrong; it should be 2475 pounds.

It is further stated, on page 53, that 96 per cent. of the total increase in the cane was extracted by diffusion in working up the 83.25 tons of Louisiana cane. Let us see if this is correct. To make this determination, the following data are at our disposal:—

	Per cent.
The total solids in diffusion juice.....	9.86
The total solids in mill juice	14.38

As in each cell there is, according to the report, 2,066 pounds of chips $\times 90 = 1859.4$ pounds juice : $1859.4 \times 14.38 = 267.38$ pounds total solids.

As 1100 litres of diffusion juice were drawn from each cell of

specific gravity 1·04, therefore they weigh 2516·8 pounds. $2516·8 \times 9·86 = 248·15$ pounds total solids. Therefore $267·38 : 248·15 :: 100 : 6 = 92·88$ per cent., that is to say, 92·88 per cent. of the total increase in the cane, or 83·59 per cent. of juice on the weight of cane was extracted by diffusion.

Hence, from Dr. Wiley's own figures, we find that 92·88 per cent., instead of 96 per cent. of the total increase in the cane was extracted. As, however, I have shown that Dr. Wiley's figures are not correct, the extraction should be as follows :—

In each cell was 2114 pounds of chips. $2114 \times 90 = 1902·6 \times 14·38 = 273·59$ pounds of total solids, as 1100 litres of diffusion juice of specific gravity 1·04 were drawn from each cell, as 1 litre of diffusion juice of 1·04 specific gravity weighs 2·25 pounds, therefore, $1100 \times 2·25 = 2475$ pounds ; $2475 \times 9·86 = 244,035$ pounds total solids ; therefore $273·59 : 244,035 :: 100 : x = 89·19$ per cent., that is to say, 89·19 per cent. of the total increase in the cane was extracted by diffusion, or 80·271 per cent. of juice on the weight of cane was extracted.

Since there was 9·56 per cent. of sucrose in the canes worked up, therefore $89·19 \times 9·56 = 8·52$. That is to say, of the 9·56 per cent. sucrose in the cane, 8·52 parts were extracted by diffusion ; leaving a loss of 1·04 parts or 10·9 per cent. by diffusion, of the total sucrose in the cane.

Dr. Wiley says, on page 53, that “the mean loss of sugar in the chips at Fort Scott was 0·38 per cent. (I presume by the word ‘chips’ he refers to the exhausted chips), and the quantity of sugar present was 9·56. The percentage of extraction was therefore 96 per cent.”

Let us see how he gets the 96 per cent. of extraction.

	Per cent.
The total sucrose in cane is	9·56
Mean loss of sugar in chips	0·38
	<hr/>
Sucrose extracted	9·18

Therefore $\frac{9·18}{9·56} = 96$ per cent. extraction ; it appears, therefore, that he subtracts the mean loss of sugar in the chips from the total sucrose in the cane, and thereby secures a remainder, 9·18, corresponding to an extraction of 96 per cent. of the total sucrose in the canes. This method is certainly incorrect, as it assumes that 0·38 per cent. of sucrose in the exhausted chips is 0·38 of one part of the total sucrose in the cane. Moreover, the report has not taken into consideration the percentage of sucrose lost in the waste waters.

However, it would be a difficult matter to get at that percentage, as no analysis of the waste waters were made while running on the second lot of Louisiana cane. The analysis of the waste waters of lot one shows that they contained 1.24 per cent. of sucrose.

Above, I obtained 89.19 per cent. extraction of the total sucrose in the cane worked from the weight of cane of one diffuser, and 1100 litres the amount of diffusion juice drawn from one cell. To verify the figure 89.19 I will take the total number of pounds of cane worked up during the second trial; also the number of diffusers of juice drawn off, and make the calculation of extraction thereon. As 83.25 tons of cane, or 166,500 pounds of chips, filled $78\frac{3}{4}$ diffusers; as, however, 85 diffusers were drawn off, being six more than there were diffusers of cane, those six should not have been drawn at all. Taking, therefore, 79 as the proper number (I use the word proper because there should never be more diffusers of juice drawn than there are diffusers filled with chips) and bearing in mind that in the mill juice there are 14.38 per cent. of total solids, and in the diffusion juice 9.86 per cent. of total solids, and that 1100 litres of juice were drawn from each diffuser, we have, assuming that the cane contains 90 per cent. of juice, $166,500 \times 90 = 149,850$ total pounds of normal juice; $149,850 \times 14.38 = 21,548.43$ pounds total solids in normal juice; $1100 \times 2.25 \times 79 = 195,525$ total pounds of diffusion juice; $195,525 \times 9.86 = 19,278.765$ pounds total solids in diffusion juice; therefore $19,278.765 - 21,548.43 = 89.4$ per cent., that is to say, 89.4 per cent. of the total sucrose in the cane, or 80.46 per cent. of juice in the weight of cane, was extracted by diffusion. It will be seen, therefore, that by either method the above figures are correct.

A few words now about the phenomenal yield of 144 pounds sugar secured by diffusion from 83.25 tons Louisiana cane. The report says that "It is thus evident that the large gain in the yield, as established at Fort Scott, cannot be due wholly to the increased extraction of the sugar. It must, therefore, be largely due to the processes of depuration employed.

"The process of carbonatation tends to increase the yield of sugar in three ways:—

"1. It diminishes the content of glucose. This diminution is small when the cold carbonatation, as practised at Fort Scott, is used; yet, to at least one and a half its extent, it increases the yield of crystallized sugar.

“2. By the careful use of the process of carbonatation, there is scarcely any loss of sugar. The only place, &c.

“3. In addition to the two causes of increase already quoted, and which are not sufficient to produce the large renderment obtained, must be mentioned a third, the action of the excess of lime and its precipitation by carbonic acid on the substances in the juice, which are truly molassigenic. Fully half of the total increase which the experiments have demonstrated is due to this cause. It is true the coefficient of purity of the juice does not seem to be much affected by the process, but it is evident that the treatment to which the cane is subjected increases, in a marked degree, the ability of the sugar to crystallize. This fact is most abundantly illustrated by the results obtained.

“Not only this, but it is also evident that the proportion of first sugars to all others is largely increased by this method. This is a fact which may prove of considerable economic importance.”

Let us see from the analysis what the process of carbonatation has done to the juice that produced this wonderful yield. The following analyses are at our disposal:—

	Sucrose. per cent.		Glucose. per cent.		Total Solids. per cent.
Mill juice	10·62	....	1·77	....	14·38
Diffusion juice	7·16	....	1·22	....	9·86
Carbonate juice.....	7·17	....	1·15	....	9·91
Sulphate juice	7·17	....	1·19	....	10·12

	Coefficient Purity. Per cent.		Glucose per 100 of Sucrose. Per cent.		Baumé degrees.
Mill juice	73·90	....	16·66	....	8
Diffusion juice	72·60	....	17·03	....	5·5
Carbonate juice.....	72·31	....	16·04	....	5·5
Sulphate juice	70·84	....	16·59	....	5·6

As the above analyses are on juices of different densities, for the sake of an actual comparison of the different juices with one another, it is best to bring the above analysis to same basis that will reduce them to terms of the dry substances. The above analyses, so reduced, are as follows:—

	Coefficient Purity. Per cent.		Glucose. Per cent.
Mill juice	73·85	....	12·31
Diffusion juice	72·62	....	12·37
Carbonate juice	72·34	....	11·60
Sulphate juice	70·84	....	11·76

	Impurities. Per cent.	Glucose. Per 100 of Sucrose.
Mill juice	13.84	16.66
Diffusion juice	15.01	17.03
Carbonate juice	16.04	16.04
Sulphate juice	17.39	16.59

From a study of the above reduced analysis of the respective juices we see—

I.—THAT BY PROF. WILEY'S METHOD OF DIFFUSION :

1. The coefficient of purity of the mill juice was lowered to the extent of 1.66 per cent. instead of raised.
2. That there was an increase of glucose of 4.87 per cent. of the glucose in the reduced mill juice.
3. That the impurities were increased by 8.4 per cent. of those in the mill juice.
4. That the proportion of glucose per 100 of sucrose was increased by 2.22 per cent. of that in the mill juice.

We also see that—

II.—BY THE PROCESS OF CARBONATATION :

1. The coefficient of purity of other diffusion juice is lowered to the extent of 3.85 per cent. of itself.
2. The glucose in the diffusion juice is diminished by 6.22 per cent. of itself.
3. The impurities in the diffusion juice were increased by 6.86 per cent. of themselves.
4. The proportion of glucose per 100 of sucrose in the diffusion juice was diminished by 5.81 per cent. of itself.

Likewise that—

III.—BY THE PROCESS OF SULPHURIZATION.

1. The coefficient of purity of the carbonated juice is lowered, instead of raised, by 2.07 per cent. of itself.
2. The glucose in the carbonated juice was increased by 1.38 per cent. of itself.
3. The impurities were increased by 8.4 per cent. of those in the carbonated juice.
4. The proportion of glucose per 100 of sucrose was increased by 3.43 per cent. of that in the carbonated juice.

To sum up the above, it should be stated that although the process of carbonatation did diminish the percentage of glucose, yet this diminution was more than offset by an increased percentage of

impurities throughout the whole process; the fact that the coefficient of purity of the diffusion juice (72.62 per cent.) was lowered by 3.85 per cent. of itself by the process of carbonatation points clearly to the injurious effect it had on the diffusion process. Moreover, since experience has clearly demonstrated that every one part of the impurities in a juice or syrup prevents the crystallization of every one part of sucrose therein, and as it has been shown that carbonatation does increase the impurities, it is evident that the treatment of the juice by carbonatation decreases in a marked degree the ability of the sugar to crystallize. The great length of time (eleven hours) required to boil one strike of sugar in the vacuum pan confirms that fact.

Relative to the yield of sugar from lot No. 2, Louisiana canes, from the report we find that the analyses of the mill juices average as follows:—

	Per cent.
Sucrose	10.62
Glucose	1.77
Water.....	85.62
Impurities.....	1.99
	<hr/>
	100.00

Total solids, 14.38 per cent.; coefficient of purity, 73.90 per cent.; specific gravity, 1.0579; Baumé, 8 degrees.

As from practical experience in making syrups and sugars I find that every one part of impurities prevents the crystallization of an equal part of sugar, the actual yield of sugar from the above mill juice, after deducting the impurities, will be as follows:— $10.62 - 1.99 = 8.63$ per cent. on the weight of juice extracted; as at Fort Scott, I find the juice extraction to be 80.46 per cent., that is, from 2000 pounds of cane, 1609.2 pounds of juice were secured, therefore 1609.2×8.63 per cent. = 138.8 pounds of sugar per ton of cane. As, however, no mill juice, but only diffusion, carbonated and sulphured juices were worked at Fort Scott, and as it has been shown that diffusion, carbonatation and sulphurization inverted a considerable portion of the sucrose and injured the juice generally, the actual yield of sugar was diminished in consequence. In order to show the falling off of the actual yield of sugar of the mill juice by the process of diffusion, carbonatation, and sulphurization, it is best to reproduce the analysis of the sulphured juice:—

	Per cent.
Sucrose	7.17
Glucose	1.19
Water.....	89.88
Impurities	1.76
	<hr/>
	100.00

Coefficient of purity, 70·84 per cent.; total solids, 10·12; specific gravity, 1·0405; Baumé, 5·6 degrees.

In order to get the actual yield of sugar the sulphured juice yielded, the juice must be first reduced to the same degree Baumé as the mill juice, that is to 8 degrees B.; the analysis of the sulphured juice will then be—

Sucrose	10·24 per cent.	} at 8 degrees Baumé.
Impurities	2·51 „	

As the glucose and water do not figure here, I have omitted them. Deducting now the impurities from the sucrose we have $10·24 - 2·51 = 7·73$ per cent. Then at 80·46 per cent. juice extraction we have $1609·2 \times 7·73$ per cent. = 124·39 pounds of sugar, the actual yield per ton of cane.

By comparison now of the actual yields from the mill juice and the sulphured juice it becomes evident that 10·44 per cent. of the actual yield of sugar per ton from the mill juice was lost by the process of diffusion, contraction, and sulphurization as practised at Fort Scott!

Having obtained the actual yield of 124·39 pounds of sugar per ton of cane from the analysis of the sulphured juice, let us see what the actual yield will be if calculated from the total gallonage of semi-syrup made and its analysis. As the reports mention that the semi-syrup was put in two tanks, but omits to state how many gallons it made, and as I measured, at the time of the experiments, the actual amount of semi-syrup in each of the tanks, I can say that the total number of gallons of semi-syrup in both tanks was 3939 gallons at 23 degrees Baumé. The average analysis of this syrup is given on page 49 of the report, and is:—

	Per cent.
Sucrose	31·4
Glucose	6·2
Water	57·6
Impurities	4·8
	<hr/> 100·0

Total solids, 42·4 per cent.; coefficient of purity, 74·05 per cent.; specific gravity, 1·1918; Baumé, 23 degrees cold.

From the specific gravity 1·1918 of the syrup the weight of one gallon of syrup at 23 degrees Baumé is 9·93 pounds, therefore $3939 \times 9·93 = 39,114·27$ pounds, the weight of 3939 gallons. As now, as before stated, every one part of impurities in a juice or syrup prevents the crystallization of an equal part of the sucrose in the

solution, we find from the above analysis the actual yield of sugar on the weight of syrup to be 26·6 per cent. (31·4 per cent. — 4·8 per cent. = 26·6 per cent.), therefore 39,114·27 pounds \times 26·6 per cent. = 10,404·39 pounds sugar; this divided by 83·25, the number of tons of cane worked, gives us again the same actual yield of 124·9 pounds of sugar per ton of cane.

To verify the fact that every one part of impurities in a juice or syrup does prevent an equal part of the sucrose therein from crystallizing, let us take the analysis of the mill juice of Gov. Warmoth's plantation of the season of 1884-85, which is:—

	Per cent.
Sucrose.....	13·05
Glucose	·67
Water	83·46
Impurities	2·82
	<hr/>
	100·00

Deducting now the impurities from the sucrose, we have 13·05 — 2·82 = 10·23 per cent., that is 10·23 per cent. of the weight of mill juice will give the actual yield of sugar per ton of cane; as the juice extraction of that season was 74·58 per cent., we have 2000 \times 74·58 = 1491·6 pounds juice, 1491·6 \times 10·23 per cent. = 151·49 pounds sugar per ton; as his actual yield was 158·42 pounds of sugar per ton, this proves the correctness of my method of determining the actual yield of sugar.

Applying this method to the season of 1885 and 1886 of the same plantation with the mill juice of the following composition:—

	Per cent.
Sucrose.....	12·11
Glucose	1·02
Water	84·20
Impurities	2·67
	<hr/>
	100·00

Proceeding in the same way as before, we have 12·11 per cent. — 2·67 per cent. = 9·44 per cent., the juice extraction being 78·07 per cent.; this gives 1561·4 pounds juice \times 9·44 per cent. = 147·39 pounds as the calculated actual yield, against 148·75 pounds sugar actually secured.

Since I have shown that the phenomenal yield of 144 pounds of sugar, claimed at Fort Scott, cannot be attributed to the juice extraction nor to the process of carbonatation, to what then must it

be attributed? In view of the fact that it cannot be traced to either of the above, it seems more like an impossible than a possible yield.

The Fort Scott diffusion process applied to Magnolia plantation during the season of 1885-86.

As I have demonstrated, that owing to the method of diffusion, as practised at Fort Scott, a great deal of the sucrose in the Louisiana cane suffered inversion, and that additional impurities went into the diffusion juice that were not in the mill juice, the yield of 124.39 pounds of sugar per ton of cane appears to be a more possible one than 144 pounds per ton. As the yield of 124.39 pounds of sugar represents 6.2 per cent. on the weight of cane, and as 9.56 per cent. was the total sucrose in the cane, then the difference, 3.36 per cent., represents a loss by diffusion of 35.1 per cent. of the total sucrose in the cane.

Taking now Magnolia's season of 1885-86 into consideration, we find that during that season the total increase in the cane was 10.90 per cent., therefore 10.90×35.1 per cent. = 3.82; $10.90 - 3.82 = 7.08$ per cent. on the weight of cane as the actual yield of sugar; 2000×7.08 per cent. = 141.6 pounds of sugar as the actual yield that Magnolia would have made by diffusion.

There is another method of arriving at the same figure (141.6 pounds), namely, by taking the polarization of the respective mill juices. At Magnolia, that season the mill juice showed an average of 12.11 per cent. of sucrose; at Fort Scott, the mill juice showed an average of 10.62 per cent. of sucrose; now, as $10.62 : 12.11 :: 124.3 : x = 141.7$ pounds, that is to say, with a yield of 124.3 pounds sugar per ton of cane at Fort Scott, Magnolia would have made, by diffusion, a yield of 141.7 pounds per ton.

The Magnolia process, applied at Fort Scott, to the second run on Louisiana cane:

First Method.—During the season of 1885-86, at Magnolia plantation, 86.6 per cent. of the total sucrose in the cane was extracted; also 78.7 per cent. of the sucrose extracted was the actual yield of sugar made per ton of cane. As the total sucrose in the second lot of Louisiana cane, worked at Fort Scott, was 9.56 per cent., we have 9.56×86.6 per cent. = 8.278, 2000 pounds $\times 8.278$ per cent. = 165.56 pounds of sugar that were extracted or went into the juice by milling; now, 165.56×78.7 per cent. = 130.3 pounds of sugar per ton of cane—the yield that the Magnolia process would have given had it been applied to the Louisiana cane at Fort Scott.

Second Method.—There is another method of arriving at the above figure (130·3 pounds) by taking into consideration the polarizations of the respective mill juices. The juice tested at Magnolia (1885-86) 12·11 per cent. of sucrose; the yield of sugar that season was 148·75 pounds per ton; the mill juice at Fort Scott showed 10·62 per cent. of sucrose; by proportion we have: $12·11 : 10·62 :: 148·75 : x = 130·4$ pounds; therefore the yield, had the Magnolia process been applied at Fort Scott to the second lot of Louisiana cane, would have been 130·4 pounds of sugar per ton of cane.

On page 52 of Bulletin No. 14, Dr. H. W. Wiley says:—

“What would have been the yield had the Magnolia process been applied at Fort Scott?”

After multiplying and dividing certain figures, he says: “The product 5·58 will be the yield of sugar which the Magnolia process would have given at Fort Scott, 111·6 pounds per ton. Deduct this from the quantity obtained and the remainder will represent the increased yield, viz.: 32·4 pounds. Thus, in whatever way the calculation is made it is seen that the process of diffusion and carbonatation give a largely increased yield.”

As Dr. Wiley makes the yield per ton 111·6 pounds, and I make it 130·4 pounds, one of us must be wrong. Granting that 111·6 pounds is the correct figure, let us now see to what juice extraction the yield of 144 pounds per ton corresponds if at 78·07 per cent. juice extraction the Magnolia process would have made 111·6 pounds per ton. By simple proportion we have $111·6 : 144 :: 78·07 : x = 100·73$, that is, say, if from 100 pounds of cane 78·07 pounds of juice were obtained the Magnolia process would have secured a yield of 111·6 pounds of sugar per ton, then, in order to secure a yield of 144 pounds per ton, from 100 pounds of cane 100·73 pounds of juice must be obtained. As, however, it is a well-known fact that in 100 pounds of any cane there are only 90 possible pounds of juice, it is impossible to secure more juice than the cane contains, or more juice than there is cane.

Since such a thing as securing 100·73 pounds of juice from 100 pounds of cane belongs to the impossibilities, it is rational to suppose that either the yield of 111·6 pounds or 144 pounds of sugar per ton of cane is incorrect. Which one is incorrect I will leave to the hand of time to figure!

April 24th, 1887.

W. P. KIRCHHOFF.

TRADE BETWEEN GREAT BRITAIN AND HER COLONIES.

On May 9th, a meeting convened by the London Chamber of Commerce was held at the Mansion House to meet the delegates of the Colonial Conference, to hear an address by Mr George Baden-Powell, M.P., on "The commercial relations of the British Empire," and to consider the best means of promoting commercial relations between England and her colonies. The chair was taken by Mr. J. Herbert Tritton, the President of the Council of the London Chamber of Commerce until the arrival of the Lord Mayor, and there was a large attendance, among those present being the Earl of Carnarvon, Lord Charles Beresford, M.P., the Right Hon. G. Osborn Morgan, M.P., Viscount Chetwynd, Sir S. W. Griffith, K.C.M.G. (Premier of Queensland), Mr. J. Stockwell Dodds (Tasmania), Mr. John Robinson (Natal), Mr. W. Keswick (Hong Kong), Sir Patrick Jennings (late Premier of New South Wales), the Hon. E. Langton (ex-Minister of Victoria), Admiral Sir E. Commerell, M.P., Mr. C. E. Howard Vincent, M.P., Mr. H. Seton Karr, M.P., Mr. Hugh Watt, M.P., Mr. W. F. Lawrence, M.P., Sir George H. Chambers, and Mr. Neville Lubbock. Delegates attended from the following Chambers of Commerce:—Aberdeen, Batley, Birmingham, Dewsbury, Derby, Edinburgh, Halifax, Hull, Ipswich, Leeds, Luton, Newcastle-on-Tyne, North Shields, Nottingham, Portsmouth, Wolverhampton, and Wigan. The Secretary of the London Chamber (Mr. Kenric Murray) read letters from the Earl of Derby and the Earl of Onslow expressing regret at their inability to attend. Letters expressing earnest sympathy with, and support of, the object of the meeting were received from the Chambers of Commerce of Glasgow, Dundee, Port of Falmouth, Oldham, Huddersfield, Salt, Kendal, Heckmondwike, Llanelly, Wakefield, Leith, and Jersey.

Mr. TRITTON, in opening the proceedings, said that in the absence of the Lord Mayor he had been requested, as President of the London Chamber of Commerce, to occupy his Lordship's place until he returned. This year had been a great year in many respects, but in none perhaps greater than in the fact that our friends from the colonies had been collected here in conference. (Hear, hear.) Underlying the great topics which they had been considering must always have been found, first, the common loyalty to their sovereign, in which they all rejoiced, then the common bond of brotherhood and goodwill in which they all also rejoiced, and thirdly, the common bond of

commerce which drew them together. They were, he was quite sure, as men of business determined to let no opportunity pass for forwarding the interests not only of themselves, but of their kith and kin, and, in a word, of this great Empire. (Cheers.) It was with that thought in their minds that that meeting was taking place that afternoon. They were assembled there to hear a paper read by Mr. Baden-Powell, than whom there was no more able exponent of the requirements of the trade of ourselves and our colonies. (Hear, hear.) They had, as the London Chamber of Commerce, no preconceived notions on this great subject of drawing together our colonies closer to the mother country in the bonds of trade and commerce, but they were anxious that all opinions should find an opportunity of expression—that what was good should remain, and that what was bad should be swept out of sight. The times were ripening rapidly. There were only two particulars to which he need advert, and which every one should bear in mind, and they were that there must be for a transaction two profits—the seller and the selling country must make a profit, and the buyer and the buying nation must also make a profit. Let the legislatures bear that in mind, and they would not get far wrong.

Mr. BADEN-POWELL, M.P., in his address, which was frequently applauded, referred to the rapid growth and present magnitude of the commerce of the British Empire. There were bright prospects for our commerce, but they depended in the main upon the continuous and rapid growth of the colonies, as compared with the completed growth of the older foreign States; and also in the fact that the colonies were the economic counterpart of the mother islands in that for the most part they produced raw materials and foods and consumed manufactures. The problem before them was the improvement of the commercial relations of the Empire. So far as private initiative and action were concerned, much might be done by facilitating the easy transference of money goods, or men from any one part of the Empire to another as industrial needs might require. So far as Government initiative and action were concerned, the Imperial and colonial Governments, as was conspicuously proved in the present Colonial Conference, could and would arrange for combined and prompt action in removing all friction and in smoothing the paths of commerce. Subject to the necessities of revenue raising and the special political demands of definite localities or times, reforms in Custom tariffs might be mutually arranged by all concerned in the directions of

uniformity, simplicity, and, if possible, reduction. The same was desirable in regard to harbour and light dues and all other taxes on commercial intercourse. In commercial legislation there was much open to practical improvement in detail and in the direction of simplicity and uniformity. In administration by means of its diplomatic and consular agencies Government collected valuable information as to supply and demand in foreign markets. Improvements in the classification of such reports and the distribution of appropriate reports in the colonies would be of much practical benefit. In diplomatic action the heads of colonial commerce must be more and more considered, both in the making of commercial treaties generally, and especially in securing for colonial produce most-favoured-nation treatment. Above all, we must remember that all parts of the Empire were now happily and vigourously co-operating with the Imperial Government to organise the defensive powers of the whole Empire.

The EARL OF CARNARVON, who was then called upon to address the meeting, said:—My Lord Mayor and gentlemen,—I came here far more in the capacity of a listener than of a speaker, and after the very suggestive and almost exhaustive paper of my hon. friend Mr. Baden-Powell I feel at a still greater difficulty in opening so large a question to such a representative assembly as that before me. I remember at the same time an old proverb, which I hope may not be applicable to me—"Where angels fear to tread," others rush in (laughter), and therefore I shall be very careful neither to promulgate any heretical doctrines nor to raise any question which might cause controversy, though I heartily agree that the object and the advantage of such a meeting as this consists in free and outspoken opinion on all points. My Lord Mayor, may I venture to add my tribute of congratulation, not only for the gathering together of so important a meeting on so important a subject, but that we should have the benefit of the presence and the counsel of those distinguished men who have come to us across the seas, whose fortunes I hold are bound up with ours, and whose hearts are united in the same hope and aspirations of empire? (Cheers.) In considering the greater union between the mother country and her colonies I have in my own mind placed these two questions first and foremost—defence and commercial relations. As Mr. Baden-Powell has well said, we have dealt in this conference, more or less, with defence, and if the subject is not exhausted and placed upon its final footing, at all events a great stride

has been made in the direction which we all desire. (Cheers.) Our commercial relations remain, no doubt, to be discussed, and whatever be the conclusion—or, indeed, if there be no conclusion at all—on such a subject, the discussion in such a friendly spirit as this must be beneficial. And I would venture to say that there is yet a third point, which I noticed was touched on by Mr. Baden-Powell—namely, the improvement of our postal and telegraphic communications. I am satisfied in my own mind that the nearer you can bring our colonies to us and us to them by means of letters and telegraphic communications, the more you will expedite and facilitate the great objects which we have before us. (Cheers.) In a very few words I would venture to say how the position of affairs strikes me, not as one, indeed, too well versed in commercial matters, but as an outsider. You have, in the first place, a vast Empire—vast in area, population, and resources—such as we may honestly say the world's history holds no counterpart. It is the first and foremost of its kind. Within the compass of that great Empire you have all the products of nature which can be named, from the most snowy climates to the most tropical. It is a world in itself. It is what the old Greek philosophers called “a self-sufficing world.” You can hardly name commodities or necessities of human life which in one part or other of that great Empire cannot be supplied, and the only parallel that I can myself think of is the great Republic across the Atlantic, to which allusion has been made this afternoon, and which in the same way contains many climates, and consequently many products. Therefore, the inference that one would draw from that is that if all these interests and parts of this great Empire can be adequately drawn together, the commercial interchange of necessities, comforts, and luxuries ought to be achieved within the compass of our own dominions. (Cheers.) There is something to be put side by side with that. We have foreign nations, foreign Governments, who, with less facilities than ourselves, desire also to become self-sufficing; and we have had now for many years past the spectacle of those foreign Governments conferring bounties with a view to supporting special industries of their own, and at the same time building up a brazen wall of tariffs against all foreigners. Again we cannot be blind to this fact, that that system of fostering by bounties and excluding by hostile tariffs is on the increase, and not on the decline. I think no one can look calmly round Europe at this moment and not see that the

tendency is all to increase the stringency of those tariffs and in no degree to loosen those bonds. (Hear, hear.) It would be a very safe prophecy to say that even within the next year or two we shall see an increase in France, Germany, and Italy, possibly in the United States; and, if I am to trust to the report of a morning newspaper, a step is being taken in that direction by Russia. I would only say one word on that subject of bounties. They have an ill sound in English commercial ears. They are politically very inconvenient. I do not know whether any of our colonial friends from Newfoundland are still in this room, but if so, they would say how greatly the inconvenience of the bounty system has been found in Newfoundland. Nor are bounties less inconvenient commercially, as our unfortunate West Indian colonies can tell. I perhaps take a strong view of bounties. As at present managed and administered they are aimed at the destruction of trade in order to create a monopoly for the bounty-giving Power, and they lead to all those difficulties to which I have just now alluded, and, therefore, I for one do not hesitate to say, though I am treading on delicate ground, that it is the duty of the Government of a country like this to set its face clearly, as stiffly and as stoutly as it can, against this system of foreign bounties. (Cheers.) I personally look upon it as an instance of commercial warfare, and as commercial warfare it ought to be stoutly and stiffly resisted (cheers), and, therefore, I look at a closer union commercially of this country and her colonies as tending in the direction which I desire to see with regard to this burning question of bounties; for I am convinced that the closer that commercial union is, the more we shall be inclined to act in support, not of aggression, but of legitimate commercial self-defence. (Cheers.) I know very well, not only, as I said, how delicate the ground is on which I tread in dealing with this subject, but also how many practical difficulties there are in the way. I know that, so far as the colonies are concerned, the Customs' duties they raise are very often raised for financial and revenue purposes. I know also how hampered this country is in many respects by that favoured-nation clause to which my friend Mr. Baden-Powell alluded. I know all this, and therefore, I know that in any real advance towards the great question which is propounded to us this evening, what we are to do to improve our relations with the colonies, it must be a matter of give and take, a matter in which there will be a great deal of forbearance and consideration on both sides. I have

occupied quite enough of your lordship's time, but I trust we shall hear from some of those present some practical suggestions in this direction. I would only venture for my own part to say this—agreeing as I do with the remark I heard here that the circumstances are now ripening, that the time is coming on fast when *solvitur ambulando* this question will be concluded, and brought to a settlement, perhaps not so much by reason as by the logic of facts—I would venture to say, in dealing with this—do not let us too much invoke the dead old formulas, do not let us attempt to be too logical in the matter, do not, above all, let us forget the enormous change that has taken place in England, in the world, in our colonies, and above all in the relations of those colonies to us during the last quarter of a century. I believe myself the solution will be found much rather in the practical adaptation of means to end, and in a common sense determination to combine, as far as it may be, the different interests and resources of an Empire which is divided and scattered in point of geography over the whole face of the world, but which is singularly and marvellously united both in heart and in feeling. (Cheers).

Sir S. GRIFFITH and Mr. GROTRIAN, M.P., also addressed the meeting, and were followed by;

Mr. JOHN ROBINSON (Natal), who said it was perfectly certain that unless some change took place with regard to the sugar bounties the production of cane sugar in our colonies would be destroyed, and we should then have to depend upon the produce of foreign powers for that important article of domestic consumption.

Mr. TINNÉ (British Guiana) said that in the past the West India colonies had been among the best of England's customers. He understood that some money was probably going to be spent in the fortification of places like Jamaica and St. Lucia, but it might possibly be more useful to spend a little money and thought in resisting the much more insidious method of attack by foreign bounties.

On the motion of Mr. WALTER LEAF, seconded by Mr. C. T. MURDOCH, M.P., a vote of thanks was proposed to the Lord Mayor.

The LORD MAYOR, in acknowledging the vote, expressed regret that he had not been able to be present at the opening of the proceedings. He afterwards proposed a vote of thanks to Mr. Baden-Powell, which was cordially agreed to.

Mr. BADEN-POWELL briefly replied, and the proceedings then terminated.

SOME THOUGHTS ON COUNTERVAILING DUTIES.

BY ALFRED FRYER.

At the present time some of the nations on the Continent are in one form or other giving to their own people a bounty on the export of beetroot sugar. They say in effect, "If you will send a pound of sugar out of the country you shall receive (say) a halfpenny of the public money." This is obviously a strange and suicidal proceeding. It amounts to taxing their own people in order to supply other nations with sugar at less than cost price! Yet the foreigners are more consistent than at first sight appears. If they are so stupid as to injure the whole of their people by raising the price of imported manufactures by means of duties, in order to benefit a section of their people (their manufacturers), they will be equally likely to tax still further the patient people in order to benefit their sugar-makers, although by doing so they happen to benefit the English consumer of sugar. In neither case do they care for us, nor, indeed, for their own tax-payers, but only for what they think is the protection of their native industries. Their taxed people, as Mr. Bright once said, resemble "Issachar, a strong *ass* crouching down between two burdens." England is abundantly supplied with sugar, and the price is cheap, so that half the bounty is lost in the process of urging forward the unnatural trade. But still the sugar is forced into our market, and the Russian or French refiner can thus undersell the British refiner and Colonial planter, and, in fact, realise a handsome profit, whilst the latter have to put up with a loss. Can nothing be done to check this obvious injustice? "No!" laughs the foreigner; and parrot-like he screams out, "Free trade! Free trade!! Don't hinder us from selling our sugar. We claim freedom of trade, and if we are prepared to sell our sugar to your consumers at less than cost price so much the better for them, and you must not interfere." We should reply, "Thank you, we are fully alive to the interests of the British consumer, and will look after his permanent as well as his temporary welfare. We are also interested in our sugar refiners and the people they directly and indirectly employ, and in all the merchants and proprietors who own sugar plantations in Mauritius, the West Indies, and elsewhere. If, however, we could obtain a binding undertaking from you, that you would for ever supply us with sugar for less than cost price, we might entertain the idea of accepting your proposal;

but as we know that you 'don't care a rap' about us, and will certainly cease your insane game some day, and probably not very long hence, we must take care that you don't tamper with our trade until you have ruined half the people engaged in it, and then this British consumer you speak of so tenderly will have to pay smartly for his sugar; so you see we don't think it statesman-like for us to allow you to undermine our trade. However, we won't stand in the way of your generosity, but instead of appropriating your bounty to each person who eats your sugar, we will just collect your largess as a whole when the sugar enters the country, and we will then pay the proceeds into the Exchequer, and thus benefit the consumer to the precise volume of your bounty by lessening the amount of taxation. We won't exclude your sugar, nor even tax it, but will just place a countervailing duty upon it of the exact amount you have granted as a bounty.

"We shall, indeed, be gratified to receive your assistance in fixing the amount of the duty. We won't make it too high, for we wish to have our market freely open to all comers; and we won't make it too low because we are determined to remove the bounty and to restore fair play and free trade. Indeed, the truth is we have long given up the idea that the consumer is to be alone considered when his interest is adverse to equal justice to all, for we have for many years sent Lord Lyons at times to the French Minister and Sir Edward Malet to Prince Bismarck, with their request that they would withdraw the bounties. In these acts we sacrificed the consumer. Besides it is *infra dig* for our ambassadors to go cap in hand as if seeking for a favour, whereas if the subject be rightly looked at, the foreigners are really granting us a boon! We intend in future to impose the duty, and then shall be supremely indifferent to the action of the foreigners. If the sugar should continue to come, our traders will have to meet the competition on fair terms, and the country will obtain all the bounty, and the longer the game lasts the better for us. If the sugar be withheld, the very object that our Government has striven to obtain will be accomplished, and there will be no departure from the doctrine of free trade. The cane sugar producer shall not be protected, and the beetroot grower shall neither be prohibited nor overweighted, but shall simply be divested of the premium which gave him an unjust advantage."

"Beware what you do," the disconcerted and well-nigh beaten beet-man might warn us. "If you impose a countervailing duty on

our beet sugar, we shall raise the duty on British manufactures." "We scarcely think so," would be the response, "for you can't really believe that such a course would induce us to remove the duty. Besides, your rasp blades from Sheffield and your sugar bags from Dundee would be made dearer, and you would find in the attempt to punish us you would be injuring yourselves. Besides, your tariff is absurd and adverse already, and as you never considered us before you are not likely to consider us now. You have fixed your duties just precisely to suit what you consider your own interests, and you will not depart from such an intelligible policy. Besides, you see the case as clearly as we do, and all that really puzzles you is why we did not take this sensible step many years ago. And, last of all, protection is doomed. The game is too costly even in ordinary times, but during the present period of depression, which is falling most severely on the most protected countries (as is natural), the fallacy must become apparent. With the fearful cost of armaments throughout Europe, and the lavish expenditure and increasing debt of France, the costly and suicidal system will be found to be intolerable, and the beginning of the end of protection will be near. If there be a country on the face of the earth in which protection is possible it is the United States of America. It is in fact a continent of federated nations, and can exchange within itself the manufactures of the East for the farm produce of the West. There is sugar extracted from the cane in Louisiana, from beet in California, and from the maple and sorghum in the North. Silver and gold are found in Nevada, coal and iron in Pennsylvania. Moreover, the nation is young, land is abundant and cheap, the people are industrious and intelligent, and yet, even in the great Republic, the game of protection is played out. They have had a commission patiently sitting to consider and report on the depression of trade, and its report is agreed on and will soon be published. After an exhaustive inquiry they have come to the conclusion that the working classes of England are better off than the working classes of other countries, and that this fact is mainly due to the effect of free trade; and finally they recommend that the policy shall be adopted in the United States."

If this be the state of things in America, how much intensified must the situation be in France and Germany. That the method suggested is consistent with a reasonable and far-sighted policy will become more evident if we imagine a parallel case. Let us suppose that our cousins across the Atlantic, appreciating the benefits accruing

to themselves from sending us so generous a supply of corn, cheese, bacon, and beef, should determine to endeavour to obtain the whole of the trade, as a smart and 'cute trick. They would reason thus: "We have no export duties, and the Britishers have no import duties on our produce; we don't see how we can obtain a greater share of their trade without a system of bounties such as the French and Germans have imposed and the Britishers have quietly suffered. These would be excellent in conception and practicable in achievement. If we once could crush out their farmers we should secure the entire trade to ourselves, and might soon revert to genuine free trade. Then we should obtain higher prices for our produce, for we should not have those dar—that is far—mers to reckon with. And indeed the farmers are so badly off just now that they will soon be bowled over. Our Exchequer, too, is so full of cash that we don't know what to do with it. We will just grant a bounty on export at the rate of 10s. per quarter on wheat, 2d. a pound on cheese, bacon, ham, and beef." The power of production in the United States is enormous, and their finances could not fail them in such an act of fiscal war. The effect produced in this country would be that every person would in the first instance benefit to the extent of 20s. a year, or less than a penny a day, but the farming industry of the British Islands would be destroyed, and then prices would advance to a higher point than previously. There is no room for doubt what would be the action of our Legislature. They would not await the arrival of the first cargo of bounty-fed produce, but all parties would agree in instantly passing an Act for the imposition of countervailing duties in order to paralyse the atrocious attack designed to ruin a great industry. It is obvious that if the bounty system be tolerated, it may be applied to other industries than that of sugar, and they may be undermined and ruined in succession.

The free trader is consistent. He insists that all the peoples of the earth constitute one large family, whose interests are usually best promoted by their being allowed to exchange their productions freely. He thus objects to a protective duty being imposed in his own country, as well as to another duty of a like nature being imposed by other nations. He knows that trade will flow most freely if permitted to take its natural courses, and strong in this conviction he objects as stoutly to scooping out of a channel of bounties in order to coax its flow to one direction as to damming up its course by protective imports in order to impede its progress in another.

AVERAGE EXPENSES AND PRODUCTION OF A CUBAN CENTRAL SUGAR FACTORY.

WITH SOME ACCOUNT OF THE HABITS AND CONDITION OF LABOURERS
ON CUBAN SUGAR ESTATES.

(Continued from page 233.)

We have now reached the period when

GRINDING OPERATIONS

commence, or in other words when the work of the Factory begins. We have mentioned already that grinding operations commence in Cuba about the 15th December, and extends up to April or May, according to the season, the size of the crop, and the effective power of the plantation.

As before stated, 36 carts deliver daily at the mill 680 arrobas or about 152 cwts. sound cane; each cart making 4 trips each day. This makes a total per day of 24,480 arrobas or 5,464 cwts. cane.

Our crushing is of double pressure with five rollers, and extracts upon an average 70 per cent. of juice, the remaining 30 per cent. being damp bagasse. This is equivalent to 17,136 arrobas or 3,825 cwts. juice and 7344 arrobas or 1,640 cwts. bagasse; so that 1 arroba of cane (25lbs.) produces $17\frac{1}{2}$ lbs. juice or $1\frac{3}{4}$ gallons, making 42,840 gallons per working day, and in the same way 1 gallon juice being equal to 1lb. sugar, we have 42,840lbs. or about 382 cwts. of sugar.

The reader will at the same time notice, that at this plantation or Factory, that 25lbs. sugar is obtained from a little more than 3 cwt. of cane, and that consequently $1\frac{1}{2}$ cwt. clarified sugar is equivalent to 22 cwts. cane. Ten pounds of juice being the weight of each gallon producing one pound of sugar.

It will be seen from the figures given that for every 5 bags or 62 arrobas (14 cwt.) of sugar, about 900 arrobas (200 cwts.) of cane has been crushed at the mill, which averages 25 hhds. of sugar per working day. The damp bagasse delivered from the mill, as already stated, is equivalent to 30 per cent. of the gross weight of the cane. When dried for fuel at the sugar kettle furnaces, it loses 50 per cent. of its weight, that is 3,672, arrobas, or 15 per cent. of the gross weight of the cane. The ashes from this bagasse weigh on an average 120 arrobas, or 3,000 lbs. which is heaped to be used for fertilizing. After

being mixed and prepared with 60 per cent. of manure and other substances, it is distributed over 6 acres of cane field. Three tons of dried bagasse used as fuel is equal to a ton of coal, on an average.

Though we have said that the grinding season in Cuba extends over 4 or 5 months, we generally find that the weather, and other circumstances, only allow about 100 days for good work. Consequently we take this figure, as the basis of our operations at our Central Sugar Factory.

Cane purchased and delivered at the crushing mill conductor*—
14,400 loads sound cane in 100 days' work, weighing net:—

2,448,000 arrobas or 546,428 cwts., at \$2 $\frac{50}{100}$ per 100	} \$61,200† =
arrobas or 2,500lbs. = 10s. per 23 $\frac{21}{100}$ cwts.	
	} £13,784

GRINDING AND FACTORY EXPENSES.

General:—	\$	£	\$	£
1 Manager	2,500 ..	563		
1 Book-keeper	340 ..	77		
1 Accountant	200 ..	45		
1 Cane-weigher	425 ..	96		
1 Carpenter	180 ..	40		
1 Mason	140 ..	32		
2 Cooks	250 ..	56		
1 Blacksmith	160 ..	36		
2 Watchmen	250 ..	56		
1 Messenger	75 ..	17		
80 Messes at \$4 each per month	1,600 ..	358		
Government and city taxes	1,000 ..	224		
			7,120 ..	1,600
Crushing mill:—				
1 Chief engineer	500 ..	112		
1 Assistant ditto	400 ..	90		
12 Hands at the crushing mill depart- ments	1,350 ..	304		
8 Hands carting bagasse	800 ..	180		
Oils, paints, oakum, &c.	200 ..	45		
Brushwood for boilers, &c.	1,000 ..	224		
			4,250 ..	955

* On this sugar plantation the colonists have no carts or oxen of their own. The owner of the lands provided them with the 36 carts and the 72 yoke of oxen, charging them in account current at the rate of 70 cents per trip.

† In converting the Spanish dollars or *pesos* into English sterling, the Cuban market par value has been taken. Consequently £1 = \$4 $\frac{14}{100}$.

Sugar-house :—	\$	£	\$	£
1 Sugar maker	1,200	270		
1 Assistant ditto	400	90		
40 Hands at sugar-house departments	4,500	1,020		
Lime, twine, marking ink, &c.	150	34		
12,500 empty bags at 25c. each	3,125	704		
Filling, weighing, sewing, and marking the sugar bags	400	90		
			9,775	2,208
Seaboard or market :—				
Railroad freight to seaboard	7,464	1,680		
Storage at ditto	3,110	700		
Brokerage on amount of sales	484	110		
			11,058	2,490
Grinding, manufacturing, and marketing expenses.			32,203	7,253
Cane ground			61,200	13,784
Total gross expenses			<u>\$93,403</u>	<u>£21,037</u>

PRODUCTION.

42,840,000lbs. = 1,713,600 arrobas = 382,500 cwts. juice = 70%	
18,360,000lbs. = 734,400 ,, = 163,928 ,, bagasse = 30%	
61,200,000lbs. = 2,448,000 ,, = 546,428 ,, cane, gross weight.	

The above given amount of juice produced, has rendered the following quantity of sugars :—

2,998,800lbs. = 119,952 arrobas = 26,775 cwts. = 70% centrif. sugar.	
856,800lbs. = 34,272 ,, = 7,720 ,, = 20% do. molasses do.	
428,400lbs. = 17,136 ,, = 3,835 ,, = 10% do. molasses.	
4,284,000lbs. = 171,360 ,, = 38,320 ,, sugars packed and sold	

as follows :—

9,673 bags* centrifugal or clarified sugar, No. 11 D.S., pol. 96°, weighing net :—

119,952 arrobas or 2,998,800lbs. at 5rs. per	
arrobas of 25lbs., or at 2½ cents per lb.	\$74,970 .. £16,885
2,767 bags centrifugal molasses sugar, No. 9	
D.S., pol. 87°, weighing net :—	

* There is a difference of $\frac{3}{4}$ c. per lb. in the market price in favour of sugars packed in bags as compared with those packed in hhds. or boxes on account of the cost of the dackage.

34,272 arrobas or 856,800lbs., at 3½rs. per		
arrobas, or at 1¾ cents per lb.....	\$14,994 ..	£3,377
12,440 bags* at 40 cents each	4,976 ..	1,120
252 hhds. centrifugal molasses gaug. net,		
42,840 gallons, pol. 42°, at \$8 per hhd. of		
170 gallons† delivered at R. R. Depôt	2,016 ..	454
Total gross production	<u>\$96,956</u>	<u>£21,836</u>

The above production shows that each caballeria de tierra of 33 acres from the 40 devoted to cane, have rendered a little over 62 hhds. or 310 bags of sugar, but if we take into account that the colonists at the plantation control 50 caballerias, or 1,666 acres, then the average production to each caballeria of 33 acres hardly reaches to be 50 hhds., or a little over 248½ bags sugars.

LIQUIDATION.

Total gross production of the estate	\$96,956 ..	£21,836
Total gross amount of expenses	93,403 ..	21,037
Net profits	<u>\$3,553</u>	<u>£799</u>

From said figures we come to the conclusion that the estate has rendered for a year's work an apparent net profit amounting to \$3,553, or £800; but if we examine the matter in a close business-like way, we will find out the results to be of a most disastrous character. Let us only figure out the interest to which the large amount of money invested in the estate is entitled to.

INTEREST ACCOUNT.

Value of 60 caballerias de tierra			
or 2,000 acres of lands, embraced by the estate, at \$1,500			
each caballeria, or \$45 each acre	\$90,000 ..	£20,270	
Rate of interest: 6% per year.†	\$5,400 ..	£1,216	
Value of buildings, machinery, and implements	150,000 ..	33,784	
Rate of interest: 6% per year	9,000 ..	2,042	
	<u>240,000 ..</u>	<u>54,054 ..</u>	<u>14,400 ..</u>
Apparent net profits reported		3,558 ..	799
Actual loss		<u>10,842 ..</u>	<u>2,459</u>

* Equivalent to 2,487 hhds. sugars of 62 arrobas each.

† The Cuban domestic hhd. holds from 175 to 200 gallons molasses, but as molasses ferment easily, they never fill them up to the full capacity.

‡ In Cuba the current rate of interest is generally 12 per cent. per year, and the legal rate is 8 per cent. per year. In exceptional cases 6 per cent. is accepted, and we have here taken this rate as the most moderate one ruling.

Such a statement plainly shows that the owner of this central plantation sugar factory has paid to his colonists an extravagant price for their cane. If he had bought the cane at \$2.50 per 100 arrobas in place of \$2.50, he would have realized a handsome profit from his investment. To this, he may answer that competition compelled him to allow such price, as his colonists bound him by written contract to pay the same price ruling in the neighbourhood, and which was considered to be in accordance with the sugar market prices. Consequently, in this case, the colonists have had the full benefit afforded by the sugar market, having the use of the lands, machinery, &c., for nothing, or, in exact words, for only \$3,558, or £799.

At any rate, the history of the crop realized by this central plantation sugar factory plainly shows that the system can be established and give splendid profitable returns by practical experience, aided with judicious management. But at the same time, this shows the planter or company, wishing to establish the central plantation factory system, that it is not in every and all cases where the plan gives profitable results. It is necessary to own good lands and advantageously situated, secure smart and hard-working colonist, and command plenty of money so as to not be compelled to borrow the same in the market. Just for curiosity sake, we will here give out a liquidation of a sugar and molasses seaboard merchant contract in Cuba, with a planter, of *good financial* standing, that borrowed \$30,000 or £6,756, in advance of the crop, and payable with the very first sugars and molasses to arrive at the market.

Dr.

Cash advanced.....	\$30,000	..	£6,756
Four months; interest: 1% per month	1,200	..	270
$\frac{1}{4}$ c. per lb. from amount of sales—sugar	3,100	..	698
\$1 per hhd. ,, ,, —molasses ..	160	..	36
$2\frac{1}{2}$ % commission on \$30,000	750	..	168
	<u>35,210</u>		<u>7,928</u>

Cr.

4,000 bags centrifugal sugar weighing net:			
49,600 arrobas or 1,240,000lbs. at 5 rupees per			
arrobas or $2\frac{1}{2}$ c. per lb.	\$31,000	.	£6,980
160 hhds. molasses, at \$8 each.....	1,280	..	288
	<u>32,280</u>		<u>7,268</u>
Less $\frac{1}{2}$ % brokerage....	161		36
	<u>32,119</u>		<u>7,232</u>

Balance in favour of seaboard merchant \$3,091, £696. To balance this amount the planter must continue delivering sugar to the seaboard merchant under the same conditions stipulated above. The reader will plainly notice that our planter for the benefit of using \$30,000 for four months has been compelled to return \$35,210, or in other words paid a premium of \$5,210. And it should be understood that in Cuba, that is considered to be a contract under very favourable terms for the planter. A planter of a poor financial standing, would have to pay $1\frac{1}{4}\%$ monthly interest and $\frac{1}{2}c.$ per lb. from the value of the sugars, besides mortgaging the plantation in a legal way. Unfortunately in our days, this is the position of the majority of the Cuban planters, as well as at many other sugar producing countries.

J. D. EKISS.

GREEN BAGASSE BURNER; "SODAL" SYSTEM.

The central plantation sugar factory, "San Lino," owned by Messrs. Montalto Bros., situated in the district of Cienfuegos, Cuba, is considered one of the largest and finest estates in the island, and it is expected that the present crop will amount to 50,000 bags, or 7,000 tons of centrifugal sugar. This year the factory is using the green bagasse burner known as the "Sodal Patent," with the very satisfactory results described below. The Sodal invention consists in a method of burning the green bagasse of the sugar cane or any other combustible in a damp state, and is applicable to any kind of boiler or steam generator, and to apparatus for boiling sugar with direct fire and in the open air. The combustible is to be introduced either from above or at the side in the direction of the blast from the rear, or, in other words, from the part opposite to the furnace, so as to reach it in a contrary direction to the draught to the chimney. It is to be noted that during the first half-hour or thereabouts the fire is to be made with some other dry fuel, so that the first fire current being established, and the passage which the green bagasse has to traverse being heated, the latter will get dry before it reaches the furnaces. The mechanical arrangement is exceedingly simple and neat, carrying the bagasse in a very uniform manner, and without any possible interruption. The chemist at the San Lino is Mr. S. Boulanger, who has published the foregoing details in the leading Havana dailies,

and invites planters and those professionally interested in examining the process to visit the central factory and inspect the advantages obtained with the new system now in full operation.

The results usually obtained by drying the bagasse in the sun, or by natural combustion, are as follows :—

One hundred parts of cane crushed by double pressure give 30 per cent. of bagasse, the composition of which is nearly as follows :—

	Per cent.
Water	50.50
Sugar	11.50
Glucose	0.40
Mineral Substances	0.40
Cellulose and Organic Substances	37.20

This bagasse, dried in the sun, loses the saccharine part by fermentation, and also a portion of its humidity, and then has the following composition :—

	Per cent.
Cellulose and Organic Substances	78.81
Water	21.19

Now, of the 30 per cent. green bagasse which we had, 14.16 per cent. remains, and assuming that what is lost while out drying in the sun is 0.66, there will be left only 13.50 per cent. of the quantity of cane bagasse.

$$78.81 \text{ C}_{12}\text{H}_{10}\text{O}_{10} \text{ give } \frac{72 \times 78.81}{162} = 35.02 \text{ of carbon.}$$

$$35.02 \times 8,000 = 280,160 \text{ caloric.}$$

The 21.19 of water, assuming the initial temperature to be 30° centigr., the gases of the chimney to issue at 400°, and the specific heat of the steam to be 0.50, will require for its evaporation: $21.19 [70 + 537] \times (300 \times .5) = 16,040.83$ of caloric, leaving consequently $280,160 - 16,040.83 = 264,119.17 = 2,641$ of caloric for one part of bagasse, and for one part of crushed cane $\frac{2641 \times 13.5}{100} = 356.53$

This shows that by drying the bagasse in the sun and air, 356.53 of caloric is obtained for each unit of cane.

Let us now look at the result from green bagasse. Of the 30 per cent. of bagasse, about 1 per cent. is lost, and 29 per cent. is left for burning, having the following composition :—

	Per cent.
Water	50.50
Sugar	11.50
Mineral Substances .. .. .	.40
Glucose .. .. .	.40
Cellulose and Organic Substances	37.20

37.20 of cellulose $C_{12}H_{10}O_{10} = 16.53$ of carbon
 11.50 of sugar $C_{12}H_{11}O_{11} = 4.84$ „
 0.40 of glucose $C_{12}H_{12}O_{12} = 0.15$ „

} = 21.52 of carbon.

$21.52 \times 8,000 = 172,160$ of caloric.

The 50.50 of water will require for evaporation :—

$50.5 [70 + 537] + (300 \times .5) = 38,228.50$ of caloric,
 $172,160 - 38,228.50 = 133,931.50$ of caloric, equivalent to 1339.31
 for one part of green bagasse, and for one part of cane,
 $\frac{1339.31 \times 29}{100} = 388.40$ of caloric.

Then $388.40 - 356.53 = 31.81$ of caloric for one unit of cane in favour of the green bagasse.

It is now generally admitted that in crushing with double pressure and using filter-presses, in addition to the sun-dried bagasse one-half cord of wood is burned as fuel for each hogshead of sugar made, while in conformity with the results now obtained with the green bagasse, scarcely half this quantity is burned.

The central factory, "San Lino," has ten boilers in regular work, giving complete satisfaction. We close this description by remarking that the alcohol at present being made from the cane at San Lino is superior to what is made in Germany from potatoes and corn.

LOUISIANA CROP.—The *New Orleans Picayune* gives a carefully-prepared statement showing the result of the last crop in detail. The total proves to have been 151,427 hhds., against 220,882 hhds. for the previous crop, as made up by the *Picayune*. The total crop in pounds is given as 196,088,321 lbs., say 87,535 tons of 2240 lbs., against 122,274 tons last year. The past season has been one of the most unfavourable experienced in a number of years. The prospects for the coming season are as bright as the retrospect of the past season is gloomy. The planting period just over has been unprecedented, and a splendid stand of both plant and stubble is reported from all sections of the State. The acreage has in most cases been increased.

IMMIGRATION IN BRAZIL.

The following information respecting immigration in Brazil, is extracted from a report by Mr. G. T. Ricketts, Her Majesty's Consul at Rio de Janeiro, dated the 4th February last, and which was published in No. 45 of the Annual Series (1887) of the Reports by Her Majesty's Representatives abroad on subjects of general and commercial interest:—

“Foreseeing that many difficulties are likely to be experienced in this country within the next few years owing to the scarcity of labour and the gradual extinction of slavery, the Brazilian Government has annulled the law of 1879 suspending immigration, the object at present being to induce colonists to take up their abode in this country. Accordingly, it was decreed on September 28th, 1885, that one-third of the sum set apart for the emancipation of slaves should be devoted to the aid of colonisation. This is expected to yield about 1,500,000 milreis, and will go towards defraying the expenses on this head, which are estimated at 2,772,000 milreis, or a figure somewhat greater than appeared in the budget of 1878.

“Furnished with this fund, it is intended, first, to organise a regular service towards establishing a propaganda in various countries in favour of this measure; second, to aid the transport of emigrants from their homes in Europe to their places of destination in Brazil; and third, to reorganise the system of marking out and measuring the lands granted by the Government.

“Those persons who have hitherto acted as immigration agents are no longer to be employed, the Government confiding this matter to its own employés. The aid of the Brazilian Consuls in foreign ports is also invoked for this purpose.

“As regards the first of these measures, steps have already been commenced by a Government agent in Norway and Sweden, and notices have been published in the Italian, German, and other languages, setting forth the favours to be obtained by those who are desirous of settling in Brazil. Among the advantages mentioned, and which, by the way, were all made known in the year 1884, we observe the following:—

“ ‘Lodging and maintenance at the Island of Flores.

“ ‘ Journeys to be paid by rail or steamer from the Island of Flores to the nearest point of destination in Brazil.

“ ‘ Concession of a lot of good land, marked out and measured, containing 300,000 square metres, or 75 acres, at the cost of 495 milreis, this amount to be paid within the space of five years, and in default of this 20 per cent. to be added. The exchange is calculated at 8 dollars 885 reis to the pound.

“ ‘ Prizes are also to be distributed as a remuneration for good productions.’

“ The above may be looked upon as advantageous by those who are well-to-do, and bring with them a small capital to commence with, but it is not easy to understand how a poor emigrant can be expected to exist, much less to prosper, if called on to pay within five years, even supposing his good fortune enables him to obtain a prize for his productions, the debt with which he is saddled from the beginning. Nor does it seem reasonable that he should be called on to liquidate his debt at a rate of exchange by which he would certainly incur considerable loss.

“ Whether immigration should be stimulated by the action of the Government, or whether it should be left to itself, is a subject on which there is much diversity of opinion; but if it be held desirable to encourage the flow of emigration from Europe to Brazil, some terms, far more advantageous than those here mentioned, and which up to the present have been productive of but small results, should be guaranteed by those settling in this country.

“ The question is often asked whether there is any chance of success for a British subject going to Brazil? To this it may be answered, the advantages to be derived by emigrants taking up their abode in this province, if in search of service, are high wages at the present moment; the advantages obtainable by persons settling on Government lands must depend on the quality, quantity, site of land, and the amount of labour at the disposal of the settler. The disadvantages are to be found, among other things, in the danger to which the European frame is exposed from working in a tropical sun, in the laborious work which is necessary to open out a soil covered with a rank and thick vegetation on the sides of steep hills, in the want of good lateral communications in the interior, in the differences certain to be brought about from jealousy on the part of the inhabitants, in the difficulties arising from diversity of language, manners, and customs, and in the expense of living.

“As the disadvantages seem to outweigh the benefits, one is led to the conclusion that this part of Brazil is not suited to the requirements of British settlers.

“The majority of the immigrants are Italians and Portuguese. There are very few British Settlers in this province, and of those who went to Corityba some years ago, in the province of Parana, there are hardly any now remaining, the majority having returned home.”

THE RIVALS OF THE PARCEL POST.

There is a popular belief that the Parcel Post, in the hands of the Government Department, has handicapped private enterprise, and beaten the railway companies out of the field. This is a delusion, however, for the extraordinary fact is that the traffic of the companies has actually increased, and the Post Office business has been really created. In an interview with one of the chiefs of the London and North Western Railway Company we have obtained the following statistics showing the strides which have been made in parcel carrying:—

In 1880 the fourteen largest railway companies in England and Scotland carried $16\frac{1}{2}$ million parcels, and in the first year of the Post Office the railway record fell to $12\frac{3}{4}$ millions; but the Post Office, in their first year—from August, 1883, to August, 1884—carried 21 millions, so that there was an enormous bound in the total. The following tables, which relate to the fourteen principal railway companies in Great Britain, well show how the various classes were affected:—

	1 lb.		2 lbs.		3 lbs.
1880—Railways	3,754,236	..	3,222,464	..	2,641,266
1884— „	2,278,536	..	2,390,544	..	1,943,760
„ —Post Office	8,333,700	..	5,595,900	..	3,324,800
	4 lbs.		5 lbs.		6 lbs.
1880—Railways	2,333,638	..	1,460,970	..	1,732,722
1884— „	1,920,984	..	1,307,280	..	1,734,408
„ —Post Office	1,456,000	..	1,044,300	..	590,000
	7 lbs.		Totals.		
1880—Railways	1,398,912	....	16,544,208		
1884— „	1,043,952	....	12,619,464		
„ —Post Office	656,000	....	21,000,800		
Fall on Railways.....			3,924,744		
Increase on total.....			17,076,056		

GRADUAL PROGRESSION IN REVENUE.

To show how little the Parcel Post has affected the London and North Western, the receipts from 1881 to the middle of 1886 may be studied, and it will be found that they exhibit a gradual progression. These figures, it may be explained, include horses, carriages, and dogs, as they are lumped together in the parcel trade:—

Half-years ending	Amount.	Half-years ending	Amount.
June, 1881	£242,446	June, 1884	£282,549
Dec., „	272,391	Dec., „	303,251
June, 1882	252,969	June, 1885	287,168
Dec., „	285,369	Dec., „	319,033
June, 1883	259,936	June, 1886	294,062
Dec., „	292,072		

THE DIFFERENCE IN RATES.

The increase in business, no doubt, may be ascribed to some extent to the more favourable rates, but the London and North Western, and other companies too, for that matter, had endeavoured to move in this direction before the Parcel Post was instituted. It had been long felt that the system was very antiquated, being a survival of the old post days; but difficulties in the way of through arrangements barred the way. However, the London and North Western introduced an amended scale of rates quite a year before the Post Office set to work, under which the rate for a pound parcel up to fifty miles was reduced to 4d., the previous rate being 6d. There were also considerable reductions on all distances over 200 miles, the maximum charge being brought down from 5s. 10d. to 4s. In May of last year the rates were again remodelled, when there were further reductions on the long distances and an inclusive charge was made for distances over 200 miles instead of 400. The following table gives the charges of the London and North Western up to 11 lbs, and the Post Office rates:—

Distances.	1 lb.	2 lb.	3 lb.	4 lb.	5 lb.	6 lb.	7 lb.	8 lb.	9 lb.	10 lb.	11 lb.
1 Mile up to 30 Miles	0 4 0	5 0 6	0 6 0	6 0 6	0 6 0	6 0 6	0 6 0	6 0 6	0 6 0	6 0 6	0 6 0
Over 30 Miles „ 50 „	0 4 0	5 0 6	0 6 0	6 0 6	0 6 0	6 0 6	0 8 0	8 0 8	0 8 0	8 0 8	0 8 0
„ 50 „ „ 100 „	0 5 0	6 0 6	0 7 0	8 0 8	0 9 0	10 0 10	0 10 0	1 0 1	0 1 0	1 0 1	0 1 0
„ 100 „ „ 200 „	0 6 0	6 0 6	0 7 0	9 0 9	0 10 1	1 0 1	1 0 1	2 1 2	1 4 1	2 1 4	1 6 1
„ 200 „	0 6 0	6 0 6	0 7 0	9 0 9	0 10 1	1 0 1	1 0 1	3 1 3	1 4 1	6 1 6	1 8 1
Post Office	0 3 0	4 ½ 0	6 0 6	7 ½ 0	9 0 9	10 ½ 0	1 0 1	1 ½ 1	3 1 3	4 ½ 1	6 1 6

In conclusion, it may be noticed that it is the experience of the London and North Western that anything over 2s. 6d. is a prohibitory charge for a parcel.—*Pall Mall Gazette*

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I.,
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Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

5660. J. THOMPSON and J. BLACK, Glasgow. *Improvements in or connected with sugar cane mills.* 19th April, 1887.

5982. F. A. ENZINGER, London. *Improvements in filter presses.* 25th April, 1887.

6261. J. BUCHANAN, jun., Liverpool. *Improvements in apparatus for drying and granulating sugar, salt, and like substances.* 29th April, 1887.

6431. S. VICKERS, Liverpool. *Improvements in apparatus for cutting and dividing sugar or like friable substances into blocks or cubes.* 3rd May, 1887.

6936. P. J. E. HEFFTER, Altjaner, Germany. *Improvements in the method of clarifying and saturating sugar solutions, especially beet-root rob by the means of tannic acid or tannin.* 12th May, 1887.

ABRIDGMENTS.

1931. M. A. PERRET, Paris. *Improvements in apparatus for extracting the saccharine or other soluble matter from sugar cane and other substances.* 7th February, 1887. The sugar cane cut up into small pieces is made to travel continuously forward out of contact with air from a hopper to the exit of the exhausted material, being passed by means of screws successively; first, through one or more compartments where it is softened by steam; second, through revolving slicing apparatus; third, through any desired number of diffusion chambers, in each of which the material is successively saturated with liquid, kneaded together and herewith and then subjected to pressure for extracting the liquid again, while on issuing from the last of the chambers the material is subjected to a final compression for extracting the remaining liquor. The liquor enters the last chamber and then each of the other chambers successively and finally is withdrawn at the first steaming chamber.

5562. T. M. AITKEN and J. MCNEIL, Govan, Lanarkshire. *Improvements in machines for cutting or reducing sugar canes.* 22nd April,

1886. A vertical disc is fixed on a horizontal shaft in bearings on a bed-plate, an inclined guide is placed on the bed-plate at the back of the disc so as to lead the sugar down obliquely to the horizontal radius of said disc's radical planing knives.

361396. T. C. A. CARRE', Nantes, France. *Apparatus for the manufacture of sugar in blocks.* April 19th, 1887. The invention consists in the combination with a sugar mould of truncated pyramidal form of taper plates fitted to opposite sides thereof, to make the internal cavity of the mould of prismatic form, and two opposite ones of which are longitudinally grooved, and parallel partition plates having longitudinal and transverse ribs on their faces, and fitted to the grooves in said taper plates, the said ribbed plates serving to divide into slabs the sugar poured into the moulds, and the ribs on said plates serving to produce in said slabs longitudinal and transverse notches or grooves, in which the slabs can be easily broken to form blocks of cubical or other form.

362068. S. T. ESKEN, Sugar Valley, Georgia. *Evaporator for sugar-making purposes.* May 3rd, 1887. An evaporator sub-divided transversely into separate compartments, and each fitted at its opposite ends with a rectangular strainer, said strainers being arranged in two opposite rows upon pivoted crank bars, and the crank shafts having adjustable notched handles whereby the strainer is adjusted to, and held at the required handle.

GERMAN.

ABRIDGMENTS.

38551. P. SCHWENGERS SÖHNE, Uerdingen-on-Rhine. *Process for extracting sugar from molasses and sugar syrups, and obtaining the salts contained in them in the form of oxalic acid compounds.* 30th March, 1886. The molasses or sugar syrup is dissolved in a little methyl alcohol, in which both are perfectly soluble; through addition of an alcoholic solution of oxalic acid, the salts (Kalisalze) are changed into oxalic and salt, and as much alcohol is added as will precipitate these as well as sugar; the precipitate is filtered off and dissolved in water, the oxalic acid salts are separated from the solution so obtained by adding alcohol, while the remaining solution of sugar is treated with lime in order to remove all traces of the oxalic acid. The oxalic acid salts form a valuable by-product.

38570. E. FRANKE, Lüben. *Improvements in knife-boxes for cutting-machines.* 20th July, 1886. The knives are fixed on a removable

ledge, the end pieces of which are slid into an inclined groove. By this arrangement double-edged knives can be used and a smaller number of knife-boxes employed.

38654. L. ZANKA, Moedritz, Austria. *Improved root-cutting machines.* 10th June, 1886. The surface of the cutting disc is not even between the two knife boxes, but raised, or lowered; or broken, consequently the knife feeders have a corresponding rise and fall. Before the roots come to the cut they sink to the lowest point of the disc, and are then, at the last moment, by means of the inclined surface of the feeders, raised to the knife.

38678. M. M. ROTTEN, Berlin. *Crystallisation vessels for candy sugar.* 9th July, 1886. The vessels are enlarged underneath in a conical form in order to prevent the saccharine substance which sinks in consequence of its heaviness from touching the sides, as is the case with the ordinary vessels in use. The bottoms of the vessels are made convex or concave, in order to facilitate the breaking out of the bottom crust.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, May 12th, 1887.

FAIR REFINING.	960/0 CENTS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
May 12, 1887.—17-16c.	5½c.	5 11-16c.	5 5-16c.	Jan. 1, 1887—102,279 tons.
May 13, 1886.—4½c.	5 11-16c.	6½c.	6½c.	Jan. 1, 1886— 57,328 tons.
May 14, 1885.—4½c.	5½c.	6 7-16c.	5 15-16-6c.	Jan. 1, 1885— 89,186 tons.
May 15, 1884.—5 5-16c.	6½c.	7 1-16c.	6½c.	Jan. 1, 1884— 60,900 tons.
May 17, 1883.—7½c.	7½c.	8 13-16c.	8½c.	Jan. 1, 1883— 50,297 tons.
May 18, 1882.—7½c.	8 3-16c.	9½-¾c.	9 5-16-¾c.	Jan. 1, 1882— 43,927 tons.
May 19, 1881.—7 7-16c.	8½c.	10c.	9½c.	Jan. 1, 1881— 66,999 tons.
May 13, 1880.—7 9-16c.	8 9-16c.	9½-½c.	8½-¼c.	Jan. 1, 1880— 63,558 tons.
May 15, 1879.—6 5-16c.	7 3-32c.	8½c.	7½-8c.	Jan. 1, 1879— 50,773 tons.
May 16, 1878.—7½c.	8c.	9½c.	9-9½c.	Jan. 1, 1878— 48,230 tons.
May 17, 1877.—10c.	11c.	12½c.	11½-¾c.	Jan. 1, 1877— 25,885 tons.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO APRIL 30TH, 1886 AND 1887.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1886.	1887.	1886.	1887.
	Cwts.	Cwts.	£	£
Germany	1,506,328	2,515,153	1,030,139	1,357,313
Holland	111,650	128,273	78,284	70,172
Belgium	321,821	385,635	215,593	197,441
France	3,224	6,993	1,863	4,109
British West Indies & Guiana	786,219	926,948	688,382	681,221
British East Indies	118,139	66,021	67,958	29,105
China and Hong Kong	44,226	112	26,393	81
Mauritius	36,972	33,240	25,869	15,860
Spanish West India Islands	—	—	—	—
Brazil	297,138	288,153	206,155	150,978
Java	2,026,054	1,336,748	1,624,755	892,194
Philippine Islands	164,572	57,774	98,943	26,059
Peru	250,388	139,002	189,052	85,849
Other Countries	243,147	197,657	182,873	113,955
Total of Raw Sugars ..	5,909,878	6,081,679	4,436,259	3,624,337
Molasses	33,466	66,307	12,826	21,266
Total Raw Sugars	—	—	4,449,085	3,645,603
REFINED SUGARS.				
Germany	530,653	956,755	465,826	735,346
Holland	309,689	438,921	284,652	341,794
Belgium	36,562	54,094	35,492	44,907
France	182,896	467,768	174,819	349,200
United States	453,377	356,166	409,643	286,179
Other Countries	594,896	64	499,552	37
Total of Refined	2,108,073	2,273,768	1,869,984	1,757,463

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	47,705	34,778	34,429	18,775
Belgium	14,435	17,199	10,873	10,499
France	20,727	17,649	16,277	10,762
Portugal, Azores, & Madeira	34,465	39,336	26,261	22,130
Italy	20,475	32,256	15,192	19,277
British North America	3,896	5,693	4,330	3,329
Other Countries	120,195	103,500	95,867	68,000
Total	261,898	250,411	203,229	152,772

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of April compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1884, 1885, and 1886, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"LUMPS AND LOAVES."						"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.						
	Monthly Average.			Apl.	Apl.	Apl.	Monthly Average.			Apl.	Apl.	Apl.	Monthly Average.			Apl.	Apl.	Apl.	
	1884	1885	1886	1887	1885	1886	1887	1884	1885	1886	1887	1885	1886	1887	1884	1885	1886	1887	
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	
France.....	2737	2035	1462	1263	2053	1146	1586	1621	546	2688	4584	472	816	5353	4353	2581	4150	5846	7439
Holland	3580	4247	3505	3729	4333	3457	3114	1948	1555	1428	1756	1526	1022	1881	5528	5802	4936	5486	5295
Germany & Austria ..	552	956	990	1757	842	558	2811	2380	2359	6634	10203	3569	7783	16789	2362	3815	7624	11959	19300
Belgium	183	214	344	400	351	442	548	151	116	113	275	127	124	306	334	339	457	675	854
United States	962	722	854	442	615	662	408	3286	10654	5078	4094	12342	4175	8116	4348	11375	5982	4451	12937
Russia .....	..	..	..	..	..	..	..	..	..	3412	..	..	4375	..	..	..	3412	..	4375
Other Countries .....	..	..	..	..	..	1	..	121	12	9	..	..	..	..	121	12	9	..	1
Total	8014	8174	7158	7591	8194	6266	8767	9607	15742	19362	20826	18780	18595	32939	17621	23916	26520	23417	41706

SUGAR STATISTICS.—GREAT BRITAIN.

TO MAY 21ST, 1887 AND 1886. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1887.	1886.	1887.	1886.	1887.	1886.
London	73	117	123	108	120	134
Liverpool ..	81	113	99	92	104	107
Bristol	3	7	25	23	24	21
Clyde	52	82	88	83	104	99
<hr/>						
Total ..	209	319	335	306	352	361
<hr/>						
	Decrease..110		Increase..29		Decrease.. 9	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. TO APRIL, 1887 AND 1886.

	STOCKS.		DELIVERIES.		IMPORTS.	
	May 1st.		In April.		In April.	
	1887.	1886.	1887.	1886.	1887.	1886.
New York	93	87	99	63	123	84
Boston	17	14	22	17	27	19
Philadelphia	1	1	15	10	15	10
Baltimore . . . . .	..	..	..	..	..	..
<hr/>						
Total	111	102	136	90	165	113
<hr/>						
	Increase.. 9		Increase.. 46		Increase.. 52	
Total for the Year	—	—	407	341	416	386

In the case of Baltimore, where nothing is put down, it means that the Stock, Imports, and Deliveries, do not exceed 500 tons in each case.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
30TH APRIL, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
214	190	57	172	109	22	764	884	856

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
30TH APRIL, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
1217	492	50	383	186	344	2671	2497	2519

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP,
OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1887-88.	1886-87.	1885-86.	1884-85.
	Tons.	Tons.	Tons.	Tons.
France.....	550,000 ..	500,000 ..	298,407 ..	308,410
German Empire ..	1,000,000 ..	1,012,500 ..	838,131 ..	1,154,817
Austro-Hungary..	450,000 ..	525,000 ..	377,032 ..	527,766
Russia and Poland.	450,000 ..	475,000 ..	537,860 ..	386,433
Belgium	100,000 ..	95,000 ..	48,421 ..	88,463
Holland and other Countries	50,000 ..	50,000 ..	37,500 ..	50,000
Total.....	2,600,000	2,657,500	2,137,351	2,545,889

Mr. Licht's estimate for the next campaign (1887-88), as compared with the present incomplete figures for the current campaign (1886-87), indicates a decrease of 57,500 tons. It is noteworthy that Mr. Licht's latest estimate for the current campaign (1886-87), exceeds his first estimate by 187,500 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

There is no life in the sugar market, either in raws or refined, and prices are about the same as they were a month ago. The stocks in the United Kingdom, as compared with this time last year, show a reduction of nearly 110,000 tons; still notwithstanding this great diminution in stocks in this country, and the lessened visible supply, and the fact of the consumption throughout the world having largely increased—about 275,000 tons for the year ending April—the effect upon prices, as yet, is nil. The feeling of those who have to handle sugar,—excepting perhaps the retailer who must be doing well out of the low prices now ruling, is one of disgust.

Mr. Licht has just published his estimate—subject of course to revision as time goes on—of the next European beet crop, 1887-88, which indicates a possible deficit, as compared with the crop now drawing to a close, of 57,500 tons. A year ago, his estimate for the present crop, was 190,000 tons below what it is now likely to turn out to be.

German beet, 88% f.o.b., is 11s. 10½d., and for new crop, October and December, 11s. 7½d.

The imports of American refined for April were 8,518 tons, making a total for the four months of 17,807 tons, against 21,414 tons for the corresponding period of 1886. The imports of refined from all Countries up to end of April, 1887, show an increase upon 1886 of 7,588 tons. If we take the imports for April, 1887, for France, Germany, and Austria, they show an increase upon April, 1886, of 16,736 tons; and for the United States the increase is 3,381 tons; or, together, over 20,000 tons.

On the 21st May, 1887, the deliveries for the present year in the United Kingdom show an increase of 28,806 tons, and the imports a decrease of 9,008 tons, as compared with 1886.

The stocks in the United Kingdom on 21st May, 1887, were 209,147 tons, against 318,963 tons in 1886, or a decrease of 109,816 tons.

Present quotations for the standard qualities, as under, are:—

FLOATING.			Last Month.
Porto Rico, fair to good Refining	11/9 to 12/-	against	11/9 to 12/-.
Cuba Centrifugals, 96% polarization	12/6	„	12/6
Cuba Muscovados, fair to good Refining..	11/9 to 12/-	„	11/9 to 12/-.
Java, No. 14 to 15, good to strong	13/6 to 14/-	„	13/6 to 14/-.
LANDED.			Last Month.
Madras Cane Jaggery	8/6 to 9/6	against	8/6 to 9/6.
Manilla Cebu and Ilo Ilo	8/6 to 9/-	„	8/6 to 9/6.
Paris Loaves. f.o.b.	14/9 to 15/3	„	14/9 to 15/3.
Titlers	17/-	„	17/-
Tate's Cubes.. .. .	18/9	„	19/-
Austrian-German Beetroot, 88% f.o.b. ..	11/10½	„	11/7½ to 11/9

THE SUGAR CANE.

No. 217.

AUGUST 1, 1887.

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153 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

In another part we give an important address by Mr. Quintin Hogg, on the Diffusion Process. He has recently visited the Aska Works (India), and he gives us, in this address, some very interesting information of what is being done there; he also gives us the results of the experiment with diffusion, so far as it has gone, upon his own estate, *Nonpareil*, Demerara. It will, no doubt, be carefully studied by planters everywhere, as well as by sugar engineers in this country and abroad.

The past month has been one of Petitions, Debates, and Deputations upon the Sugar Bounties, and we are cheered with the hope that some practical results will follow. A large proportion of the present number is occupied with reports of these. An animated correspondence has been going on in the Liverpool papers, as a result of the debate in the Liverpool Chamber of Commerce. We are sorry that our space precludes our doing more than giving one or two of the letters which have appeared on the subject.

If any of our readers have spare copies of the following works we are prepared to give a good price for them:—

- I. *Memoire sur le Pou à Poche Blanche présenté à la Chambre d'Agriculture.* 8 pp. Ile Maurice. 1864.
 - II. Report of the Select Committee appointed for the purpose of examining the extent of the damage caused by the Cane Borer in the Mauritius. 21 pp. 8vo. Mauritius, 1856.
-

GERMAN SUGAR COMPANIES,

Company.	Sales, &c.	Outlay and Expenses.	Gross Profits.	Written off.	Gratification, Interest, &c.	Cost of Beets.
	Marks.	Marks.	Marks.	Marks.	Marks.	Pfennig.
Rostock .....	.....	.....	270,480	28,430	....	<i>a</i> 50
Weferlingen ..	2,030,864	1,815,499	215,364	105,963	....	.....
Anklam (Po- merania) .. }	.....	.....	140,337	91,530	9,087	<i>b</i> 72 $\frac{3}{4}$
Vechelde	534,484	447,776	86,808	21,151	....	<i>c</i> 115
Schlade	1,872,968	1,794,281	78,686	39,401	....	.....
Peine .....	.....	569,386	.....	54,799	....	<i>d</i> 96
Weetzen .....	.....	704,822	.....	62,281	....	<i>e</i> 126
Lippe .....	.....	.....	83,320	45,652	4,512	<i>f</i> 92
Glauzig .....	.....	.....	.....	.....	.....	.....
Broistedt	945,500	.....	104,050	32,789	....	<i>g</i> 96
Wierthe	586,611	.....	45,490	15,560	....	<i>h</i> 100
Wallwitz .....	.....	.....	.....	.....	....	<i>i</i> 92 $\frac{1}{2}$
Holzminden	534,249	490,051	44,198	.....	....	<i>j</i> 68
Lafferde .....	.....	.....	38,757	.....	....	.....
Modran (Bohemia) .....	.....	.....	.....	.....	....	.....
Körbisdorf	1,355,120	1,213,098	142,023	57,620	....	<i>l</i> 93 $\frac{1}{4}$

a Cost of working (in addition), 41 pf. per centner.

b " " " 36 $\frac{3}{4}$ " "

c " " " 49 $\frac{3}{4}$ " " (The yield was 1 ctr. of sugar from 8·12 ctr. beets.)

d Cost of working (in addition), 57 pf. per centner.

e " " " 37 $\frac{1}{4}$ " " (The yield of sugar was 12 $\frac{3}{4}$ %, polarizing 95·63°.

CAMPAIGN 1886-1887.—(Continued from page 339.)

Company.	Net Profit.	Loss.	Carried forward or put to Reserve.	Dividend.	Capital.	
	Marks.	Marks.	Marks.		Shares, &c.	Loan.
Rostock	229,884	....	R. 12,166	....	.....	.....
Weferlingen	109,401	....	.....	....	.....	.....
Anklam (Pomer- ania)	48,815	....	{ R. 5,348 } { F. 4,043 }	7%	.....	.....
Vechelde	65,657	....	.....	20%	.....	.....
Schladen	39,285	....	.....	....	.....	.....
Peine	148	....	R. 148	....	.....	.....
Weetzen	3,446	....	.....	....	690,600	550,000
Lippe	38,667	....	{ R. 1,934 } { F. 1,481 }	5%	.....	.....
Glauzig	138,646	....	.....	3%	.....	.....
Broistedt	71,260	....	.....	....	.....	.....
Wierthe	29,930	....	.....	....	.....	.....
Wallwitz	74,858	....	R. 74,858	....	.....	.....
Holzminde .....	?	....	.....	....	.....	.....
Lafferde .....	?	....	.....	....	.....	.....
Modran (Bohemia) ..	fl 200,000	....	.....	....	.....	.....
Körsbisdorf	34,238	....	{ R. 33,253 } { F. 985 }	....	.....	.....

f Cost of working (in addition), 29 pf. per centner.

g " " " 46³/₄ " "

h " " " 53¹/₄ " "

j " " " 63¹/₂ " " (including interest).

i Yield of sugar, 12%, exclusive of molasses.

k Last year this factory lost fl. 85,000.

l Cost of working, 81 pf. ; yield of sugar, 12¹/₂%.

The death is announced, in London, of Mr. William Thompson Mann, of Bowmere Lodge, Tarporley, Cheshire, an active partner in the famous engine factory and Phoenix Foundry—Messrs. Fawcett, Preston, and Co., of York Street and Lightbody Street, Liverpool. Mr. Thompson Mann's firm was probably one of the oldest engine factories and iron foundries in Lancashire, being, as Sir James A. Picton tells us, "originally an offshoot from the great ironworks of Coalbrookdale, and was commenced under the management of George Perry." The concern was subsequently carried on by Mr. Joseph Rathbone, and afterwards by his nephew, Mr. William Fawcett, who, firstly under the style of Fawcett and Burrows, afterwards as Fawcett and Preston, was connected with it for more than half a century. "The concern," as Sir James remarks, "is still carried on under the same designation, and a more honourable one it could not have." Mr. Mann, who had been connected with the Phoenix Foundry the greater part of his life, was a magistrate for the Eddisbury division of the county of Chester.

The increase of specie in the United States Treasury since 1881 is very remarkable. It is as follows:—

	Gold.		Silver.		Total.
	£		£		£
May 1, 1887....	55,067,000	..	48,563,000	..	103,630,000
Jany. 1, 1887....	53,620,000	..	43,800,000	..	97,420,000
Jany. 1, 1886....	50,670,000	..	39,460,000	..	90,130,000
Jany. 1, 1885....	47,000,000	..	36,080,000	..	83,080,000
Jany. 1, 1884....	43,803,000	..	30,240,000	..	74,043,000
Jany. 1, 1883....	34,301,000	..	25,000,000	..	59,361,000
Jany. 1, 1882....	34,523,000	..	19,800,000	..	54,323,000
Jany. 1, 1881....	31,340,000	..	15,800,000	..	47,140,000

It will be seen that whilst the growth of the silver has been more rapid than that of gold, yet the gold alone exceeds by nearly £8,000,000, the gold and silver combined on January 1, 1881.

In consequence of the discussions on the bounty question taking up so much room, we have been compelled to hold over until our next issue several papers of interest.

THE DIFFUSION PROCESS.

(Reported by William Deakin Ithell, for the *Demerara Argosy*, and carefully revised and corrected by the author.)

On June 27th, Mr. Quintin Hogg delivered at the Exchange Rooms (Georgetown), his promised lecture on Diffusion. There was a numerous attendance of proprietors, attorneys and managers of estates; most of the leading mercantile houses in Georgetown also were represented. Mr. P. H. Nind, M.A., President of the Planters' Association, presided, and briefly introduced the lecturer, who on rising was warmly welcomed.

Mr. Quintin Hogg: I am glad Mr. Nind has described the subject matter of my lecture in the terms he has just made use of, as I shall deal rather with the twenty years' experience Mr. Minchin has gained at Aska than with the rather crude attempt which we have as yet been able to make at *Nonpareil*. I should like also to make it clear that I do not stand here as an advocate of diffusion, but my desire is, mainly, to let others know the facts and data which I have gathered in connection with the subject, which so far as I know could not have been obtained save through the instrumentality of Mr. Minchin, or his chief manager, Mr. Kollman, at Aska. My first introduction to Mr. Minchin was in 1877, shortly after I had tried the system known as Tooth's, which I believe to have been one of the very best ever introduced into this colony. Mr. Minchin called on me in London and asked me for the figures which I had got together in connection with Tooth's process. Those I gave to him, and we afterwards had a conversation on diffusion. It then appeared to me, on comparing notes with him, that he was doing, from a money point of view, very little, if at all, better than I was. This put diffusion out of my head for some years; nor did I again seriously think of it until my last visit to the colony in 1886, when Mr. Schultz, the representative of the Sangerhausen firm, called upon me and endeavoured to persuade me to order a plant. As you know, the state of affairs last year was not such as to induce proprietors to go in for extensive speculative trials.

Mr. Schultz however was so earnest in the matter, and offered to back his opinion to such an extent, that I, at last, entered into serious negotiations with him. Finally, the terms settled between us were somewhat as follows:—He undertook on the part of his firm to furnish

me, landed in Demerara, with a complete diffusion plant at his own risk, which plant he guaranteed should be capable of dealing with four hundred tons of canes in twenty-four hours; also that the diffusion juice should not be less pure than that which came from the mill, and that the total extra dilution should not exceed 22 per cent.

On my return to England, I found that this last point was not quite clear. By 22 per cent. I had understood that not more than twenty-two gallons of water were to be added to every one hundred gallons of juice, whereas my German friend apparently had understood something quite different. Finally, however, the Sangerhausen firm defined their idea of 22 per cent. by stating that it represented a dilution of 2° Beaumé; that is to say, if our mill juice is at 9° the diffusion juice from their battery should not be less than 7°. Subject to this, they undertook to give me within a very small decimal point the whole of the sugar contained in the cane. Furthermore, I was to be the sole arbiter as to whether the terms had, or had not been, fulfilled. Having this responsibility laid upon me, I made up my mind to proceed to the one place in the world where I could really study diffusion as applied to sugar cane. So, I booked my passage for India and found my way to Aska, making use of the cordial invitation which Mr. Minchin had given me nearly ten years before.

Aska is situated in the extreme north of the Madras Presidency, about thirty-two miles from the sea, and about the same distance from the Chilka Lake, the one great lake of India. The place is not easy to arrive at, as it can only be reached by slow coasting steamers which entirely subordinate the convenience of passengers to the exigencies of freight. After a week's coasting, however, we arrived at Gopalpur, and proceeded thence thirty-two miles in a bullock cart to Aska. The works themselves are of very considerable size, occupying an area considerably larger than the works of any of our East Coast estates, although the weekly outturn is comparatively small, say, about one hundred tons per week. The buildings are of a much more substantial character than those we erect here. They include, besides the ordinary machinery for sugar manufacture, arrangements for char filtration, a large distillery, and a foundry, where all kinds of small jobs and castings can be done, Mr. Minchin occasionally taking a Government contract for pieces of machinery needed in the district. Nothing could exceed the kindness with which I was treated by Mr. Minchin, the Duke of Aska as he is generally styled in the

Madras Presidency. His wealth, his commanding personal appearance, and his long residence of 35 years at Aska, have given him an almost unique position in the Presidency. He not only gave me a full run of the works, but he introduced me to Mr. Kollman, and he instructed that gentleman to let me make any experiments I liked, to take down any notes I pleased, and to have complete access to his books.

With such an introduction it would have been my own fault if I had not got fairly complete data as to what they were doing. You will see, of course, that some of the figures given me must necessarily have been of a private nature, but still I have, I believe, full liberty to give you sufficient details to enable you to form a fair idea of the outturn of sugar and of the method and cost of manufacture at Aska. Mr. Minchin himself is an enthusiast in sugar-making in general, and diffusion in particular. He sleeps in a small room adjoining his pan loft throughout the whole of the diffusion season of one hundred days; and alongside his bed there is a steam pipe with a pressure gauge upon it, enabling him to tell, at any time, night or day, the pressure his boilers are being worked at.

I think, perhaps, the most convenient method for me to adopt will be to give you first a short description of the machinery in the buildings, and then to go through them with you a second time dealing with those details of the subject which more particularly require elucidation. In the diffusion house, which was the first we entered, there are five slicers, of which four are six feet in diameter, furnished with six knives each, and run at two hundred revolutions per minute. Those slicers were made on the spot by Mr. Minchin, with the exception of the disks, which were cast in Calcutta, and he estimates their cost at £40 sterling—as against £200, the price he was asked by an English engineer. The fifth slicer was five feet in diameter, but is rarely, if ever, used. Two of the six feet slicers are kept always at work, and each runs through sixty or seventy tons of cane in the twenty-four hours, working continuously, or say, three tons per hour each. As, however, constant stoppages are necessary for the purpose of changing and sharpening the knives, an operation which at Aska takes about an hour, three cutters are kept in harness, two of which are as a rule running while the third is either at rest or having its knives changed.

I mention these details somewhat minutely, as it was the complete breakdown of the cutters furnished by the Sangerhausen people which brought our experiments at *Nonpareil* to a standstill; and I wish to

show you that the worst that can happen to us in this respect is having to adopt the Aska pattern of cutter instead of that furnished by the Sangerhausen Company. The rest of the machinery consists of a diffusion battery of twelve cells, each cell containing three-quarters of a ton of cane chips and holding four hundred gallons of water when empty, or two hundred when filled with chips.

Then there is a sulphur box very similar to what we use in this colony, and measuring tanks for ascertaining the proper charges to draw from the battery; six defecators, holding 450 gallons each, of the old French kettledrum pattern, and a range of filter bag presses used at the rate of one bag for every ton of diffusion juice passed through them; two concretor batteries of eleven and twelve plates each respectively; a double effet containing 1720 square feet of heating surface; two vacuum pans striking about seven tons, and three tons of dry sugar; nine under-driven centrifugals of the old Manlove and Alliott pattern, and the usual *massecuite* boxes. In addition to these there is an immense range—or, perhaps, I should say, several immense ranges—of other boxes for receiving the second *massecuite*. These boxes are only constructed of wood, and the sides do not make the smallest pretence of being watertight; the bottoms are slightly V shape, and are caulked and perforated with holes. The inside of these boxes is lined with bamboo matting, and the second *massecuite* is discharged into them. They find the molasses drain quite sufficiently through this matting to enable them to bag the sugar and sell it without passing it through the centrifugals. The consequence is that they get a very large return of sugar from their second *massecuite*, 3 cubic feet, giving them as a rule $1\frac{1}{2}$ cwt. of molasses sugar. I have brought a large number of these mats with me, intending to try how they will work in Demerara. It must be borne in mind, however, that in order to obtain the white sugar made at Aska considerable washing is necessary in the centrifugals—(only 41 to 44 per cent. of white sugar is obtained from the *massecuite*)—the consequence of course being that their molasses is of exceptionally good quality.

The distillery is furnished with two continuous French stills, and rum-making there, produces such good results that Mr. Minchin is quite careless as to the quantity of sweets he sends to his liquor loft. The scum and bottoms of the boxes are all remorselessly sent off to the distillery, so that no attempt is made to use filter

presses or to obtain the best possible sugar results from the juice. The return in rum is from 30 to 40 gallons per ton of sugar.

I am sorry that I had no means of getting the molasses and juice properly analyzed. As it is, I am unable to describe the constitution either of one or the other, or to state the percentage of crystallizable sugar left in the molasses. The motive power consists of one twelve horse-power engine, with a cylinder of 14 inches diameter, and 3 feet stroke. This drives the cutters, the two elevators connected with the cane chips and the grind stone. Then there is a large beam engine of twenty-five horse-power (nominal) which works the pans, the steam water pumps and the centrifugals. There is also an eighteen-horse-power horizontal engine which drives the pumps for the double effet, and one water pump. In addition to these there is an horizontal engine with double-acting pump which drives a single effet of the ordinary Relieux type which, however, is scarcely ever used. The boilers are eight in number,—two multitubular by Mirreles, 14 feet long by 7 feet 6 in. in diameter; two single flue Adamson boilers, 30 feet by 6 feet 6 in.; two smaller single flue boilers 20 feet by 6 feet, and two boilers made from old char cisterns bolted together, one of which is 74 feet long by 5 feet in diameter, and the other 36 feet 3 in. in length and 5 feet in diameter. Neither of these two latter have any flues, the fire simply playing round the outside. I may mention that the large 74-feet boiler is worked up to 36 lbs. pressure, and is used to supply steam to the diffusion battery. Of these eight boilers, six are kept in use for all purposes, and these six boilers with engines of a nominal capacity of fifty-five horses furnish the whole motive power for the Aska works. The fuel used is wood of good quality, fully equal to good courida as supplied in this country. I have estimated it as being worth about one-third of its weight in coal. Huge stacks of this wood are kept piled in the various large yards enclosed by the factory, and its cost at the furnace door was 3 rupees 4 annas per ton. Taking three tons of wood as equal to one ton of coal, the cost of the fuel is about 10 rupees, or £1 in silver currency, or say 15s. in gold, per ton of coal. Labour is, of course, very cheap, a man's pay being about two annas, a woman's one anna and four pies, and a child's one anna. As an anna is nominally worth 1½d. in silver, these wages represent in gold only about 2¼d. per day for a man, and less than 1¼d. for a child. The following is a list of the labourers employed inside the Aska works: it being borne in mind that diffusion is neces-

sarily a continuous process, it will be understood that the list includes two gangs, which relieve each other every six hours, so that one-half of the people mentioned in the subjoined table are resting while the other half are at work:—

LABOURERS IN ASKA WORKS—February, 1887.

Department.	Maistries, i.e., Mechanics or Headmen.		Coolies.	Boys.	Total.
Cane Cutters	2	..	20	..	26
Diffuser Fillers	2	..	6	..	14
„ Emptiers	2	..	12	..	16
Truck for Slices	2	..	8	..	14
Diffusion Engine .....	..	..	2	..	2
Oil Men .....	..	..	2	..	2
Sulphur box and measuring tanks .....	..	..	4	..	6
Water Pumps .....	..	..	..	2	2
Six Defecators	2	..	4	..	8
Bag Filters	1	..	8	..	9
Concretor Trays	4	..	..	4	8
„ Stokers	2	..	8	..	14
„ Juice Cistern .....	..	..	2	..	2
Water Floor .....	..	..	2	..	2
Double and Single Effet	2	..	..	..	2
„ „ Engine .....	..	..	2	..	2
Syrup Cleaner .....	..	..	2	..	4
Large Engine	2	..	..	2	4
Boilers (six at work)	2	..	20	..	22
Head Maistries	2	..	..	..	2
Second „	2	..	..	..	2
Mechanics for Cutters	2	..	..	2	4
Pan Stage	2	..	2	..	4
Centrifugals	2	..	22	..	32
Coolers .....	..	..	2	..	2
	33		128	44	205

Well now, to go a little more into detail as to what is done in this factory. In the first place the canes are all grown by the neighbouring peasantry, and perhaps the best proof I could possibly give you as to the financial results of diffusion may be found in the fact that Mr. Minchin is able to pay three dollars and thirteen cents (\$3.13) per ton for his canes, though their juice only stands at barely 8½° Beaumé.

Yet he is one of the few sugar manufacturers not complaining of the present depression of the times. The canes are brought to the factory door in bullock carts, bound into bundles of, say, about 28 lbs. each, which bundles are stacked end on in sheds immediately contiguous to the cutters. About eight coolies are constantly employed taking these bundles on their heads and putting them on a platform seven or eight feet high on which stands the mechanic who feeds the slicers. This man takes a knife, cuts the trash band binding the bundle together, and gathering a small armful of canes, puts them into the hopper down which they appear to be drawn by the rotary motion of the knives. No pressure was needed on the part of the man feeding. These vertical cutters give none of the trouble we experienced with our horizontal cutters at *Nonpareil*. In connection with these machines Mr. Kollman's advice was something as follows:—"Mind, you keep your knives sharp; you must have a mechanic for this work, and he may just as well be employed in doing his work as in eating rice. The very instant therefore that the slices begin to show the least sign of being torn or jagged instead of being cleanly sliced, the machine must be stopped, the knives taken out to be sharpened, and the spare cutter set to work." Another great point is that the slices should be as thin as possible. Mr. Minchin aims at having his one millimeter, say the 32nd of an inch in thickness; as a matter of fact they as a rule more nearly approach to two millimetres than to one, but the latter was the ideal desired. These slices fall on an endless band which runs in front of all the machines, and discharges on to another sloping carrier by which the slices are carried up to the floor above and discharged into a large wooden hopper. From this hopper they fall into a wooden truck which stands on a weighing machine and contains just one-half of the ordinary charge of a diffusion cell. As the diffusers hold 1,725 lbs., each waggon was loaded with chips of half that weight, and was then slid along a little wooden tramway and its contents shot into the diffuser that was being filled. The moment this was done, two coolies jumped into the diffuser and pressed the chips down with their feet. Two or three minutes afterwards, a second truck load arrived and was dealt with in a similar manner. The diffuser was then screwed up and instantly attached to the battery. Of the twelve cells only about nine were as a rule kept at work; and a cell was filled and diffused and emptied on an average every eight minutes throughout the week.

Mr. Minchin gave me a very interesting account of how very different his results were, when he first started diffusion twenty years ago. It appears that the Aska works were, in those days, in a rather bad way, and Mr. Minchin took advantage of sick leave to visit Europe, and endeavour to gain information of any suitable appliances for improving the financial condition of the works, of which he was then manager. He traversed Germany and France without seeing anything which he thought he could adapt to his own factory; but in Austria he came across Mr. Julius Robert who had just invented diffusion and was struggling to convince the beetroot manufacturers of its suitability to their needs. We all know that it has since then proved itself to be the saviour of beet, and Mr. Minchin firmly believes that it is destined to be the saviour of cane also. So struck was he with what he saw in Austria that he went back to London, got the sanction of the consignees there, and instantly started for Aska, where he constructed a diffusion battery for himself, consisting of vats very similar to what we use in our liquor lofts, only of somewhat smaller diameter. These vats contained about two tons of canes which, when exhausted, were discharged through a door in the side, the whole arrangement being so crude that in those days it took some twenty minutes to fill a diffuser, twenty minutes to exhaust the chips, and twenty minutes to discharge them—processes which, as I have already said, are now completed in eight minutes.

It may, I think, interest you to have a statement of the temperatures and densities at which the Aska battery is worked. I took several notes of the condition of the various vessels during my stay there and will give you a few samples. I will ask you to bear in mind that in every case No. 1 means the cell containing the fresh juice, from which therefore the liquor is being drawn for the clarifier loft; while Nos. 8 or 9 represent the cell containing the exhausted chips, and which, therefore, is about to be discharged. I must ask you further to remember that the Aska battery is discharged by what is known as "the wet process;" that is to say, the bottom of the cell is taken away and the 1,725 lbs. of exhausted chips and 200 gallons of hot water are allowed to fall out as they please. The disadvantage of this process is that you waste 200 gallons of hot water every time you empty a diffuser. At *Nonpareil* we have the dry process; that is to say, we force the hot water from cell No. 9 into cell No. 8 by means of compressed air, and when that has been accomplished we take away the bottom of the diffuser and let the comparatively dry chips fall out.

Here then was the state of the battery when I arrived at Aska : No. 1, 124° F.; No. 2, 140; No. 3, 164; No. 4, 186; No. 5, 205; No. 6, 212; No. 7, 205; No. 8, 200; No. 9, 190. You will observe that No. 1 is the lowest in temperature, because the hot juice has just come into contact with the mass of cold chips, through which it has to pass to the clarifier loft. There is also a desire to let down the heat in the last two or three vessels, partly to avoid wasting heat, and partly because the chips, if at boiling point, would scald the bare feet of the coolies who have to handle them down below. Here again is a statement shewing the density of the juice in the battery cells before drawing off the liquor :—

No.	deg. Balling.	No.	deg. Balling.
8	0·00	4	2·40
7	0·26	3	3·40
6	0·86	2	5·10
5	1·86	1	7·62

You will please note that the above densities are all corrected to a normal temperature of 63° F., and you may further note that whereas vessel No. 1 shews a density of only 7·63 Balling, which is about equal to 4·2 Beaumé, yet the liquor was discharged from that vessel into the clarifier at 11·75 Balling, or 6·5 Beaumé, the reason for this being that, on the Aska battery at any rate, the apparatus for ascertaining the density of the juice requires you to draw your sample from the extreme top of the vessel where the density is lowest. Indeed I found that the density of juice drawn from the top of any vessel really indicated the density of the juice at the bottom of the preceding vessel, and so on. Here is another statement giving the temperature and density of the battery just after the discharge of the 220 gallons of thick juice to the clarifier :—

Vessel No. 1—208° Fahrenheit.....	9·732 Balling.
do. ,, 2—212 do.	5·55 do.
do. ,, 3—212 do.	3·632 do.
do. ,, 4—206 do.	2·629 do.
do. ,, 5—203 do.	1·317 do.
do. ,, 6—187 do.	0·364 do.
do. ,, 7—140 do.	0·02 do.

Vessel No. 1 in this case discharged its juice into the clarifier at 11½ Balling. These three statements will, I think, enable you to form some idea of the normal temperature and density of the juice in the

Aska Battery. I may mention, however, that we very rarely got the diffusion juice into the clarifier as high as 6° Beaumé. As a rule it was about 5½°, the cane juice being 8½°, which amounts to about 60 per cent. dilution as against the 30° per cent. which the Sangerhausen firm have guaranteed to me as a maximum. Mr. Kollmann obtained about 87½ per cent. of the weight of the cane by diffusion, and he considered that he threw away only about 2½ per cent. of the juice in his water. This juice showed no acid reaction when tested by litmus paper. The cane slices however did show a slight reaction,—they coloured the paper about as much as one's finger discolours it when gently laid on a strip of litmus. Another point which must be mentioned in connection with diffusion is, that at Aska they always draw rather more than the entire contents of a vessel from the battery. For instance, at Aska, the vessels hold just 200 gallons of juice in addition to the 1,725 lbs. of cane. Mr. Kollmann never drew less than 220 gallons, and when the juice got a trifle sweeter, he sometimes took as much as 235 gallons, experience having taught him if he failed to do that he might lose a small quantity of his sweets when he discharged his chips and water. He impressed upon me especially that if any accident brought me to a standstill with my battery, the temperature of the various vessels should be kept above 160° and below 200°; above 160, because at that temperature fermentation cannot take place; below 200° because he found that if the juice was kept stewing in the battery for any length of time at that high temperature, it always gave trouble in the pans and showed a falling off in the return of *massecuite*. I especially asked both Mr. Kollmann and Mr. Minchin about the water question. They both laid stress on the desirability of having good water; but, added Mr. Minchin, "that is equally true of the water with which you supply your boilers. If I could afford it, I would filter all the water that went into my diffusion battery, and I would also treat the water which went to my boilers in the same way." He told me that two or three years ago, when they ran very short of water at Aska, he used all his condenser water—I mean, not condensed water, but the water which was pumped through his condensers for diffusion, and found scarcely any appreciable diminution of sugar as the result. I may further mention that, a few months ago, while they were trying diffusion in Australia in connection with a plant, erected by the *Fives-Lille* people, they ran short of water and actually used over and over again the liquid—I can hardly call it water—which they obtained by passing the exhausted chips through

their mill. Of course, this must have been full of impurities, yet the proprietor of the estate was so pleased with the results which he obtained, even under such adverse circumstances, that he has, I understand, ordered a second battery from the *Fives-Lille* people. The water usually used at Aska is perfectly clear river water, and it goes from the battery into the sulphur boxes perfectly clear, resembling very fine hock in colour, and as different from the green liquid which we get from our mills as anything can possibly be. Mr. Minchin knows that the moment the smallest tendency to cloudiness, or an appearance of feathery streaks, occurs in his diffusion juice, that something is going wrong with his battery.

The diffusion juice is drawn from the battery into the measuring tank, passes through the sulphur boxes, where about 60 lbs. of sulphur are burnt in the 24 hours, and runs into the defecator, holding 450 gallons, where $1\frac{3}{4}$ gallons of lime water, standing at 15 Beaumé is added, and the liquid is brought up to boiling point. Very little skimming was necessary, and the scum was so small in quantity that the product of 450 gallons could all be taken away in a single galvanized bucket.

Mr. Kollmann explained this absence of scum, by saying that the bulk of the mucilage and albumen was left in the chips. Albumen coagulates at 160° F., and as the battery there, is worked above that temperature the bulk of the albuminous matter becomes fixed in the chips. "You won't know," said he to me, "what a good thing you have got in diffusion, until you come to deal with the juice." From the defecators the juice, standing at about $5\frac{1}{2}$ Beaumé, was run through bag filters, 180 being kept at work for 24 hours, and purifying the product of about 140 tons of cane. I got some of these bags just as they were being changed, and we weighed the slush found in them. From 13lbs. to 15lbs. of wet mud were taken from each of them, and this when dried gave only 5lbs. of hard dirt as the result of say one ton of diffusion juice. This shows, I think, that no very large amount of impurity could have been left in the juice; so the absence of scum cannot be explained in that way. The juice was then run from the concretor battery. It generally went on the battery at $5\frac{1}{2}$ ° Beaumé, and after remaining $7\frac{1}{2}$ minutes in transitu came off at 11° Beaumé. Two batteries easily performed the whole work. Indeed, on an average, 50 per cent. of the juice was evaporated by these trays. The juice went on clear, and came off clear, and was not appreciably darkened by the fierce heat of the trays, no change of colour having

taken place other than that which necessarily occurred through the change in density.

As I was very desirous of finding out the fuel cost of returning the juice to its original density, Mr. Kollmann made an experiment one week, carefully weighing every pound of fuel burnt under the concretor trays and taking his juice off at, as nearly as possible, the same density as the mill juice, viz.: at $8\frac{1}{2}$ B. We found it took $12\frac{1}{2}$ tons of wood to deal with the juice from 100 tons of canes; and as 100 tons of canes gave at least ten tons of sugar, it follows that less than half a ton of coal per ton of sugar, was burnt in undoing the very heavy dilution practised at Aska, although that dilution is just double what the Sangerhausen firm guarantee me. To put the matter in another way. At *Nonpareil*, if we diluted the product of my daily task of 400 tons of canes, to the same extent as is done at Aska, I should require a triple effet of 5,500 square feet of heating surface to take out the water which I had put in. If, on the other hand, I diluted only to the extent of 30 per cent. I should require a triple effet with a total heating surface of 2,600 square feet to restore my juice to its original density.

While on the question of fuel I may as well sum up all I have to say on the matter. I have already said that six boilers are kept constantly fired at Aska, and I have given you a description of their make. The total fuel consumed in the Aska works apart from the foundry—that is to say, for the concretor furnaces, the boilers and the distillery—averages throughout the crop six tons of wood to ten tons of canes. Six tons of wood mean, I suppose, about two tons of coal, and ten tons of canes mean one ton of sugar; and that, in a factory where dilution is carried to its extreme extent, and no great desire is shown to save fuel or make the most out of the sweets. In addition to this, the chips were dried and burned, about one half of them during diffusion season and the other half after its close. I estimate the chips consumed during the diffusion season to be equal to about 25 tons of wood, not a very material item spread over 1,000 tons of sugar.

When the juice leaves the concretor trays standing, say at 11 Beaumé, it is taken into the double effet, which evaporates as nearly as possible one-third of a gallon per square foot per hour, and is brought there to a density of about 25 or 26 Beaumé. It is then struck, 400 gallons at a time, into a kind of eliminator, where it is brought to boiling point five and six times,

much as we used sometimes to deal with our juice in the old-time clarifier days. The syrup is then left for about fifteen minutes, after which all except the extreme bottom is run to the syrup tank, whence it is drawn to the vacuum pan in the usual way. The *massecuite* is boiled up to 50 Beaumé, and struck out into iron boxes. It is very good in appearance, and has scarcely any molasses on its surface. In from 24 to 48 hours it is dug out with shovels, pugged, and run through the centrifugals. As white sugar is desired three-quarters of gallon of water at least is used for each centrifugal, and the steam is turned on whenever needed. As a result they obtain from 41 to 44 per cent. of pure white sugar. The molasses is boiled up, and struck into the bamboo-lined boxes which I have described. In the event of a specially dry molasses sugar being required they sun their second product for five or six hours on the roof of their factory before they bag it. As a rule, however, the sugar is simply taken from the boxes and sent into consumption. From the sample on the table you will see that it is decidedly superior to the ordinary molasses sugar shipped from this colony. In default of a good local market, they simply store their sugar, and refine it as soon as their one-hundred-days' diffusion season is over. When refined it yields 45 per cent. of pure white sugar, the molasses re-boiled gives a further 7 or 8 per cent. and the remaining 48 per cent. of the *massecuite* is sent to the distillery.

Owing to these various methods of dealing with the second sugar it was difficult to get an absolutely exact return of the second quality sugar resulting from the canes. All through there was perfectly plain sailing as far as the *massecuite* was concerned. This *massecuite* weighed 93½ lbs. to the cubic foot, and 13 to 14 per cent. was obtained from the canes, the juice averaging 8½ B. This I take to be fully 20 to 25 per cent. more than we get in this colony from similar canes.

Before I leave this part of the subject, I should like to impress upon you that the ordinary average Aska work produces one ton of sugar from four punts of canes, although the juice in their canes is slightly inferior to the average juice in this colony. To put this in other words; they average 1 ton of sugar from every 10 tons canes; and two-thirds of this sugar is pure white, the balance being good molasses sugar. Now, as to *Nonpareil*, I do not mean to go into any great detail on this subject. It will be sufficient for me to tell you that, owing to the faulty con-

struction of our cutters, 108 tons of cane which ought to have been sliced in six hours occupied 48 hours in cutting, and the juice which ought to have been run through the battery in about an hour and a quarter, was kept stewing, sometime at over boiling point, for more than 24 hours, and when it was discharged into the clarifier loft, it had to remain for another long period before we got sufficient for the triple effect to deal with. Altogether, juice which ought to have been dealt with in six hours had to remain for 52 hours before we got it into *massecuite*. No words of mine are necessary to tell you that a trial conducted under such circumstances is no trial at all. I should not have been surprised had we got very little sugar from our experiment. As a matter of fact, however, we obtained just 20 per cent. more *massecuite* than we got from a similar quantity of canes passed through our mill, the return of the *massecuite* in the one case being 14.63 per cent. on the weight of the canes, while the *massecuite* obtained from the same weight of canes by our mill was 12.14 per cent.

I am sorry to say that the Sangerhausen people omitted to put in a weighing apparatus, in spite of my having warned Mr. Schultz on the subject. The consequence was that we had to subject our canes to a great deal of handling, and to delay our process while this handling was going on. The result, both when we tried diffusion and when we tried milling, was very apparent, for the canes which, before we had pulled them about, transporting and weighing them, gave us a quotient of purity of 95, after being handled, gave us a quotient of purity of only 82, when we sliced them for diffusion, and 84 when we crushed them in the mill, the glucose having been increased by no less than 2½ per cent. Our trial was, I considered, so far satisfactory, that it showed us that in spite of very adverse conditions, diffusion gives us almost the exact increase over mill returns which I had calculated as probable from what I had seen at Aska. It showed us also that the battery could be manipulated by our own people without difficulty. And finally, it laid altogether one bugbear, which has been prominently brought forward by advocates of the mill. I refer to the disposal of the chips. This was really a serious matter, for at *Nonpareil* when in full work we should have to deal with two tons of chips every eight minutes, and Mr. Kollmann warned me at Aska that this was by far the most serious difficulty with which I should have to contend. So much did I fear this that I sent out half a mile of wire tramway for the purpose of sunning and burning the chips, as I had seen done by

human labour at Aska. To our great relief, however, we found that our mill, the trash turner of which had been slightly raised, took our chips readily, and re-delivered them to us containing only 55 per cent. moisture, and therefore in a state to form excellent fuel. They were thrown into our green-megass furnaces, and as soon as these were got warm the chips burnt readily. Mr. Llewellyn Jones is of opinion that we may now safely count upon this difficulty having been overcome, though it is possible that some slight modification in the arrangement of the furnace bars, may be advisable.

I have only two points more to refer to, and will then conclude. In the first place, I was disappointed with the colour of our diffusion juice. We used bush water instead of the beautiful river water at Aska; but Mr. Kollmann had told me we should probably find this thoroughly filtered by passing through the diffusers, his idea being, that the chips themselves would take up the impurities in the water. I do not know whether the long exposure to a high temperature injuriously affected the juice; probably it did; but when it got to our clarifier loft, it was not nearly as clear and bright as I hoped it would be. My second remark is with reference to the cutters. We found that the description of cutter furnished by the Sangerhausen people at first would not work at all; the cush cush being thrown to the edge of the disk accumulated there till it formed such a powerful brake that you could not pinch the machine round even with crowbars. Mr. Jones obviated this by cutting small openings at the edge of the machine and making a simple arrangement for throwing out the cush cush, thus preventing the machine from coming to an absolute standstill. At the same time, however, we were very much interfered with all through our trials by the accumulation of cush cush and of shreds of cane on the outer portion of the knives. Probably not less than from 15 to 20 per cent. of the cutting surface of the knives was rendered useless by this cause. Then we found that these horizontal cutters required to be fed with considerable force, or they would not take the canes at all. As a matter of fact these horizontal cutters, which were expected to slice 200 tons of canes each, in 24 hours, actually got through only one-eighth or one-tenth of that quantity while they required six men to feed them, whereas the Aska machine easily sliced 60 tons in the 24 hours, and only needed one man at the hopper. By the terms of my contract it is the business of the Sangerhausen people to supply

me with proper cutters, and until they have done so, I shall of course resume my ordinary milling operations, merely using the interval to put on a hydraulic apparatus to our large mill so as to provide a safety valve in the event of a bolt or other hard material getting between the rollers, which, as they are set nearly metal to metal, when the exhausted slices are passing between them, would be especially liable to a big smash in the event of any hard substance getting mixed up with the megass.

ST. CROIX AND THE UNITED STATES.

Decision rendered in the United States Circuit Court, in the suit to recover duties paid upon *sugars* imported from St. Croix. No. 275, Thomas W. Durban and others, against William H. Robertson, collector. In error to the United States Circuit Court for the southern district of New York.

This was a suit brought by certain importers to recover back \$33,000. Duties exacted by the collector on sugars and molasses imported from the island of St. Croix, which is a part of the dominion of the King of Denmark. The importers maintained that the goods should be admitted free of duty under the treaty with Denmark, concluded April 26th, 1826, because like articles produced in the Sandwich Islands, were under the treaty with their kind admitted free of duty.

The Court holds that the treaty with Denmark does not bind the United States to extend to that country, without compensation, privileges which they have conceded to the Hawaiian Islands in exchange for valuable concessions. On the contrary, the treaty provides that like compensation shall be given for such special favour. When such compensation is made, it will be time to consider whether sugar, from her dominions, shall be admitted free from duty. The judgment is affirmed.—Opinion by Justice Field.

The sugar refinery of Messrs. Coelingh and Son, at Deventer (Holland), was destroyed by fire on the 20th ult. The buildings and contents were insured. Amount of loss not stated.

THE LIVERPOOL CHAMBER OF COMMERCE ON FOREIGN BOUNTIES.

ANIMATED DEBATE.

On the 18th of July, a special meeting of the Chamber was convened for the purpose of taking into consideration the injustice inflicted upon the sugar industry of this country by the existence of the foreign bounty system.

Mr. ELISHA SMITH, the President, occupied the chair, and in the course of his introductory remarks said that the fact that twenty-one members of the Chamber had signed the requisition for calling the present meeting, showed that there was a feeling that hardship existed on the bounty question. All he asked them was to give every speaker on the question a fair hearing, and allow a fair discussion. He called upon

Mr. J. ERNEST TINNE, Chairman of the West Indian Association, Liverpool, to move the following motion:—

“That this Chamber condemns the foreign bounty system as an attack upon British and colonial industries and commerce, and cordially approves of the action of the Government in inviting the foreign Governments interested to a conference on the condition of the sugar industries, and on questions connected with them; that this Chamber urges the Government to advocate, at the conference, the system of manufacturing and refining in bond, recommended by the Select Committee of the House of Commons on Sugar Industries in 1880; that this Chamber trusts the Government will arm itself as early as possible with the necessary power (to be used, should the Government see fit) to neutralise in our markets the effect of bounties should they continue to be given on sugar exported; that this Chamber directs that copies of this resolution be sent to the Premier, the First Lord of the Treasury, the Chancellor of the Exchequer, and to the members of Parliament who are honorary members of this Chamber.”

In moving the resolution, Mr. TINNE said that while all were aware that during the last three years there existed a very intense depression of trade, some of those present might not be fully aware of the special crisis which had existed in the sugar industries all over the world. Since 1861 the sugar planters had been fighting against the system of foreign bounties; some three or four years later, the refiners of this country also became involved in the same difficulties, and in the year 1884 the difficulties between us and the bounty-giving countries became intensified, and in 1884, to quote two

instances, the prices of Demerara sugar ran down from 29s. to 15s., and beetroot from 22s. to 10s. There were, of course, many reasons for this decline—the general depression of trade for one thing, and the great improvement made in machinery, which was now beginning to show its full effect. It had been contended that we had not in this country taken full advantage of the improved machinery to reduce the cost of working. Speaking of the colony which he knew best (British Guiana), and with which he was most intimate, he did not think generally that any improvement in that respect could be made. He would leave refiners to speak of the effect of the bounties on refineries in this country, a great many of which had, he believed, been closed.

Speaking of the state of matters in the West Indies, he said that in Barbados there were something like 100 estates in Chancery, and the leading firm, or one of the leading firms, had gone into liquidation. In Trinidad several of the largest estates in the island had been closed, and the leading firm had gone into liquidation. In Demerara, where they had been in advance of the whole of the West Indies in the condition of their machinery and in the fertility of the soil, and possibly in the calibre of some of the men whom they employ as attorneys or managers, they had not come to quite such an extreme crisis; but during the last three or four years they had been practically without return for their investments in the colonies. Many statements had been put forward of the loss which had been caused to foreign countries by the bounties. The loss to continental revenues from sugar bounties was stated as follows:—France, £3,280,000; Austria, £1,036,667; Holland, £309,655; Germany, £1,886,690; and Belgium, £813,000, making a total of £7,326,012 (per annum). That was a loss to continental revenues not in the sense that they made nothing at all from their sugar finances, but it was a loss in the sense that they did not get as much as they expected from their sugar taxes. In France and Germany, owing to the mode of levying the taxes, about one-third of the sugar escaped the taxation altogether. This sugar received the bounty if exported, and the loss, of course, fell on the taxpayers of the country, while at the same time the country did not receive the profit. *France could afford to sell the sugar for which she was now getting between 13s. 6d. and 14s. 6d. at about half its present price*, and he believed that the great French refiners and most of the beet factories in France were making very large profits.

Having adduced figures to show how we had become dependent on foreign countries for by far the greatest portion of our sugar on an artificial source of supply which was liable to great fluctuations, he said they had been often asked at meetings what the amount of bounty per ton was, and on what quantities. He believed that in France the present amount of the bounty upon the whole production

was between £6 and £7 per ton ; in Germany between £2 and £3 per ton on raw sugar, but in the course of the next three months it would be reduced one-half. In Austria the bounty had almost ceased to exist, and in America it would very soon have done so (hear, hear, and applause). He (Mr. Tinne), as a colonist, could not see why people in this country should look only to the wants of the English consumer and the English producer. If they wanted to have any community of interest with the colonies they must look to the English producer of sugar beyond the seas, and to the consumer of English goods. More than fifty years ago the British West Indies were the best customers England had, consuming about £3 12s. per head of English goods. In 1885, they still consumed £2 11s. per head, but had fallen below British North America and the Australias. On the other hand, Russia consumed only 1s. 2d. per head of English goods, Germany 11s. 7d., France 12s. 8d., Holland 10s. 6d., and Austria 7d. These figures showed that the cane-producing countries were still, in spite of the depression, very much the best customers England had.

The recent course of united action in this country had been to attempt to interest working men on the question, because it was they who had to decide any great question like the present. They, as the masters, must take the initiative, and what they said Mr. Gladstone and Lord Salisbury were prepared to follow. Mr. Gladstone had already condemned the foreign bounty system in the strongest possible terms. Lord Salisbury had also done so, and others, including Richard Cobden, had long ago spoken of it in a similar manner. Between 209 and 300 resolutions had been passed against these foreign bounties by meetings representing 500,000 workmen. The obvious and only remedy was to call a conference, as Lord Salisbury had already done, and to propose that all countries should adopt the system of refining in bond. That would effectually do away with it ; but supposing any country were unwilling to adopt that system, what was to be the remedy ? It was no use going to a conference with our hands tied. We must adopt the countervailing duty proposed by France twenty years ago, and which, if then adopted, would have caused the bounty system to cease to exist. As a colonist he appealed with confidence to the English to help their fellow-subjects beyond the seas (applause).

Mr. T. O. EASTON (Macfie & Sons), in seconding the resolution, said that he was inclined to think that no subject of greater commercial moment, or of deeper and wider interest than the one they were met to consider had ever been submitted to that Chamber, and he could only regret that the leading part assigned to him had not fallen into abler and more influential hands. The firm with which he was connected had been engaged in sugar refining close upon a

hundred years, fifty years of which had been passed in the port of Liverpool, no doubt to their own advantage, and, he hoped he might say, to the advantage of the community at large. The late senior partner of the firm was a past president of the Chamber, and at the present moment was one of the trustees. It was a very large question, and he was afraid he must ask their indulgence if he occupied their attention for a considerable time to advocate and elucidate the resolution which had been put in his hands.

There was a position which they could understand anyone taking up, and that position was that the bounties were a good thing, a thing to be encouraged, and the more of it they could get the better. But in taking up that position as regarded the sugar bounties the person who said that thereby condemned the action not only of the present Government in inviting a conference, but the action of all past Liberal and Conservative Governments since 1864, who have yearly been endeavouring, so far as lay in their power, that the system should be brought to an end. It was too childish to deal with the argument that some people held that it could not be detrimental to our interest, which in France and other countries was looked upon as a correct and economical theory, and it was too futile to occupy the time of the Chamber with it.

Whether they regarded the shipping bounties or other bounties, they asked the Chamber to condemn the whole system of bounties. He argued that the method of dealing with the sugar trade of this country showed that if foreign nations were successful in annihilating that industry, they might proceed to cripple and injure all other industries in detail. There was hardly anyone who would deny this, and the matter had been thoroughly sifted out before a Select Committee of the House of Commons, which had arrived at the conclusion that the effect of the system had been injurious both to home and colonial industries. He should like to explain that up to the year 1880 the only French refining industry that was in the question was the hard or loaf refining industry, and one of the conclusions of the Committee was that the effect of the bounty system had been practically to extinguish the loaf sugar refining trade of this country. But when the evidence was given before the Select Committee there were many who predicted that the attack would not end with the annihilation of the loaf sugar trade, but would pass on to the moist, which was one of much larger and greater importance. That prediction was in process of being fulfilled in this country in a very disastrous manner. It had been argued, and it was a very plausible view, that if they looked at the state of the sugar industry at the present moment, there were no signs of depression among those who were engaged in it, so far as Liverpool was concerned; and they said that if the bounties were of the enormous character described they must have had the

effect of wiping out the sugar refining industry of this country altogether. But as he had explained, it was only of recent date that the attack on the industry had commenced, and they had so far the advantage of standing up under circumstances which were rapidly coming to the limit of their endurance. The circumstances which he alluded to had led to the cheapening of sugar, and had stimulated its consumption by the lowering and abolition of the duties, and the result of the cheapening was a more general use of the article in other ways. Sweet had been the uses of adversity; it had made them look into things, with the result that he believed that they were not behind any country in the world in sugar refining. This being so, people said that there were no signs of distress amongst the trade, and he admitted that if they looked merely at the matter in Liverpool they had been able to keep up the same appearances as before, but he would remind them that it was not necessary that they should be in extreme distress, or that they should go into the workhouse, before they should draw attention to their condition. But were there no signs of depression? During the lapse of a few years four sugar houses in this country had stopped altogether, and others had closed their premises never to open again. A large house in London which had spent £300,000 upon its business could not dispose of it at the reserve price of £90,000. With regard to the statistics of the matter, the statistics of deliveries seemed to show that the consumption had been about the same during the last six months as it was during the corresponding period of last year. These statistics were deceptive. They did not show in the least what passed through the sugar refineries, and he was able to declare from his own knowledge that there was a very large quantity less passing through the refineries now than in former years. Even the statistics themselves proved that the total deliveries were 50,000 tons less last year than in the two former years. That, however, was a very narrow way of looking at the question, and one which was entirely unworthy of the Liverpool Chamber of Commerce, but he had brought it forward as he was informed that some gentleman of influence in that Chamber had been acquiring information on this point. The object of that Chamber was the promotion and protection of the home, colonial, and foreign trade and manufactures of the United Kingdom, and promoting or opposing legislative or other measures affecting such trades and manufactures.

He therefore said that they had raised that question, not on the basis of what they had lost—the loss of their profits, or the loss of their capital, or the diminution of the volume of the trade—but they came to show that a gross injustice was being perpetrated against an industry of this country, and they called upon that influential body to put forth its power to have that injustice remedied as speedily and as perfectly as possible (applause). It was not only for the prevention

of the evil, but for the promotion of trade, that he drew their attention to the matter. The production of beet sugar in Europe had grown from 6 per cent. to 58 per cent. of the total production; and he declared that this was solely owing to the artificial stimulation of the industry by means of bounties. Nearly one half of this quantity came to this country in the shape of refined sugar ready for consumption, and if that was due entirely to the bounty system, they might see how they could promote the industry of refining in this country, and get employment for at least half, and he believed for the whole, of the industrial classes, and for the benefit of the various ports where that industry was pursued. He might say that if there has been no disaster as yet in Liverpool—and he was thankful to say there had not—that did not mean that their legitimate profits were not being swept away. Many refineries elsewhere had been closed, and as men of business they would see that that had strengthened their position as long as they were able to maintain the fight, and it spoke volumes not only for the refiners of Liverpool, but also for the advantages of their port, that they had been able to stand up to the present moment; and it should be an encouragement to know that these advantages existed as regarded Liverpool, and that they could with great sanguineness expect that when the bounties were removed a large portion of the sugar trade would come to the port of Liverpool.

He desired briefly to remind them that there were other industries besides sugar refining, or even sugar planting, that were interested in this matter. Take the great coal trade. For every ton of sugar refined half a ton of coal was required. There was also the bag-making interest, which affected the manufacture of jute. The makers of machinery and sugar plant both for the West Indies and for home use were largely affected. The shopkeepers who supplied people who were engaged in this industry were also interested. Therefore no one should take a narrow view of the matter. One industry which it was said would be injured if the cheap sugar was done away with was the jam industry. They expected no great difference in the price of sugar when these bounties were swept away. People fancied because sugar was at a certain price so many years ago that the lowering of it was due entirely to the bounty system. He believed it was due to that cause to a very small extent indeed; but they must remember that what was a very small amount in itself was one of vast importance to those engaged in the industry. When he told them that the matter of a penny a hundredweight made a difference of £4,000 a year to the firm of which he was a member (Macfie Sons) they would understand how little it was that was necessary in order to enable foreigners to undersell them and blot them out. Therefore they did not expect that there would be any large rise. At the very most they put it at £2 per ton, and it was perfectly ridiculous to talk of a rise of that

character affecting any manufacture in this country. The price of fruit fluctuated and varied far more than that, and yet the jam industry went on. He would point out that the jam industry in this country had a very great advantage in competing with similar industries in any other country, because this was the only country in which they could procure sugar without duty to a very heavy extent. It was an extraordinary fact that none of those countries that gave bounties and drawbacks upon sugar when it was exported in its simple form gave any drawback when it was exported mixed up with fruit in the shape of jam, and he thought the jam industry had better keep quiet, because if they talked too much, foreign countries would begin to give a bounty upon jam as well as upon sugar.

With regard to the remedy, there were two ways in which bounties could be abolished. One was by foreign countries abolishing duties upon sugar altogether, when there would be no drawback necessary, and the other was a system of refining in bond, when the duty would be paid upon the perfected article, and therefore it would not be necessary if it was going to be exported that any duty should be paid upon it at all, and any drawback received. If this bounty system developed in France, it was utterly impossible that our colonial industry in sugar could stand against it. It was useless to suppose that when the trade profit on refining was 3d. per cwt. our manufacturers could stand. The bounty system was being developed rapidly, all that retarded it being the fear and uncertainty of the matter—first as regarded their own Government that they might wake up to the conviction that they were playing a foolish part in giving cheap sugar to England, and not only that, but making large fortunes for a few French manufacturers. The *Statist* informed them that two firms were receiving in bounties £450,000 per annum besides their legitimate profits (a Voice: "That is wrong".) Continuing, Mr. Easton referred to the negative remark, and said he could refer them to the publication he had named. As to the remedy, they had asked the Government to urge in their conference refining in bond; but, as before, it might be agreed upon in form, yet never put into practice. The objection to the countervailing duty proposed as a remedy was that it was contrary to the principles of Free Trade. Speaking of Free Trade in 1844, Mr. Richard Cobden said they did not want cheap corn merely in order to have low money prices. What they desired was to have plenty of corn, and they were utterly careless as to what they obtained it at provided it was a *natural price*. He (Mr. Easton) asked if the giving of between £6 and £7 per ton in bounty was allowing an article to circulate in the markets of the world at its natural price? Adam Smith, in his "Wealth of Nations," told them that the natural price of anything consisted of the rent, wages, natural profits which accrued through the capital

required in producing and preparing, and the cost of sending to the market. Superadded to that, or rather deducted from it, was in this instance, the bounty, which did not give the natural price, but the most unnatural one that could possibly be conceived. (Hear, hear.) He then quoted from the *Spectator*, the *Statist*, and finally from Sir William Forwood's former utterances. Though an exceedingly pronounced Free Trader, he thought that the proposal for a countervailing duty would be an absolute protection for Free Trade. With power at their back for a countervailing duty, they would soon be able to stop the bounties. He hoped that the Chamber would show by its vote that it was not going to continue under the flag of foul play, the only title to which opponents could lay claim.

Mr. MEADE-KING moved an amendment—"That this Chamber declines to take any action upon the question of foreign bounties on sugar."

The proposition before the meeting, when reduced to its naked form was a recommendation to the Chamber to memorialise the Government in favour of bringing in a bill in the House of Commons to impose a countervailing duty upon sugar. (Hear, hear.) The effect, as acknowledged by previous speakers, would be, of course, to raise the price of all the sugar consumed by every man, woman, and child in this kingdom. The object of that, so far as he could see, was to help one manufacturing interest. (Voices: "No, no, no," and "Certainly.") He could not see why anyone could say no to that, since for what other purpose had all these gentlemen interested in sugar come together if it was not to raise the price of sugar? If not, what was it? (Mr. Easton: "Not above its natural value"?) In continuation, Mr. Meade-King pointed to the arguments used by the sugar refiners that the bounty-supported producers were underselling them in the market, and that they could not sell at the prices. Was he not, therefore, right in maintaining that the object of this effort was to raise the price of sugar to every man, woman, and child in this country (hear, hear)? Mr. Tinne had adduced the apostle of Free Trade (Richard Cobden) as having denounced the system of foreign bounties. He was not at all surprised at that. There was no doubt whatever that Mr. Cobden, like every Free Trader, denounced the system of bounties, but when doing so he was talking of the system in relation to his own country—i.e., he denounced it if it were proposed to adopt it in this country. Every Free Trader denounced it in that way, just the same as if protective duties were proposed (a Voice: "No"). He ventured to think that in the present day it was not necessary to say one word towards condemning what he imagined was condemned by nine-tenths of the people in the kingdom, if they excluded those specially and personally interested in the question.

Mr. W. B. BOWRING seconded the amendment. To go back twenty years they would find that sugar refining had been one of the most prosperous industries that had ever been known in the country, and there were those who had accumulated very considerable fortunes upon it. The whole refining industry of Great Britain was, however, confined to something under thirty firms, who had a capital of £2,000,000 and employed about 5,000 workpeople. He was told that of the latter a very considerable number were foreigners (Voices: "No, no."). Certainly there were some of them foreigners, and if a countervailing duty were wanted, our labouring population were in need of one to protect them against foreign competition. Mr. Tinne, speaking for the colony of Demerara, had pointed out that they had been very progressive in their sugar refining. In some other colonies, however, they had not certainly been progressive, while the sugar they produced was both expensive and very poor. What claim had these on Great Britain to ask her to tax her people for their benefit? He did not see why 36,000,000 of people in this country should tax themselves for the benefit of the colonies. Since cheap sugar had been in vogue, very large industries had risen in this country, infinitely larger than that of sugar refining. They had, for instance, the biscuit interest, the jam interest, and a dozen others, all of which would be very seriously injured by a countervailing duty. In our treaty clauses we stood on the best terms with continental countries, and the moment we began to break up that system we would have a war of tariffs all round, and no one would know where it would end. That England was the first commercial country in the world was owing to her Free Trade and the abilities of the people. We ought to thank goodness every day that America was not a Free Trading country, because when that came we would have to meet her competition.

Mr. F. DRESSER, in supporting the original resolution, said he wanted to see the question of bounties looked at more broadly. He referred to the bounties on cleaning rice in British Burmah. If the colonies wanted us to encourage their industries, they should come with clean hands; Demerara, he admitted, had clean hands, but it was not the thing for colonies, after being protected and defended by this country, to ask us to help them in these trade questions, and then put what duty they liked upon goods which were exported from this country.

Mr. COX was of opinion that the matter should be treated as a general question. He held that if it were to be accepted as a self-evident proposition that cheapness, however obtained, and whatever the consequences, was to be the main end and aim of the commercial policy of this country, then he granted that it was no use discussing

the question of bounties. Bounties would give them everything cheap, as cheap as possible, yet he had lived in a country where wheat had been sold at a rupee for 100lbs.; but there was no happiness in that country, for the people were poor, and he found it was perfectly useless to supply people with cheap articles unless they were provided with money to buy the cheap articles with (applause). It had been said that things could not go on much longer as they now were, but they must also remember that but for the artificial encouragement it had received, beetroot would never have attained the great development it had reached. He thought it was ridiculous to say that by a system of extended bounties the various industries of England would in turn be chased from the field. The proposition came to an absurdity at last. It was the business of the Chamber of Commerce to look after the business of the country, and it was for them to do it in a persistent and logical manner. Forty years ago the nation was imbued with the notion that Free Trade was to be a great source of wealth and happiness to this nation, and though he believed that it was right at the time, there had grown up a system among other nations which was unthought of. We were now like the old, rich, proud firm which had a reputation, and would only do business in its own way regardless of the customs which had sprung up around it, but the firm would eventually find itself with its doors closed, and nothing to do. If we went on in this stupid course, the nation would find itself wrecked on the lee shore of adversity.

Mr. BARRETT said the Chamber ought to pass this resolution, because the sugar industry was very much depressed.

Mr. KENNEDY thought the action of the Chamber should refer to all bounty-fed industries.

Mr. ARMOUR said the iron trade had just as much reason to complain as the sugar trade, but they did not go crying to Jupiter to help them out of the rut. The gentlemen who had spoken in favour of what he should call a general tax of 1d. per cwt. on sugar would pocket about £80,000 per annum ("Nonsense"). He repeated his statement, and objected to a few being enriched out of the pockets of the many.

Mr. CROSFIELD said the object of the countervailing duty was not to put the bounty into the pockets of the manufacturer, but into the pockets of the taxpayer, but, if it was imposed, they would be on a fair basis, and would not be afraid of the competition of the world.

Mr. MEADE-KING asked what about the poor woman who would have to pay more for her sugar?

Mr. CROSFIELD said the general taxation of the kingdom would be reduced by the amount that was collected as a countervailing duty, and the duty would probably be taken off the poor woman's tea.

They, as refiners, did not care what the price of sugar was. They lived by the difference between what they paid for the raw material and the price of their product, and they cared for nothing but having a margin. It had been admitted by the highest possible authorities that bounties were deleterious to British trade.

Mr. BOWRING: I don't admit it.

Mr. CROSFIELD: I did not say you; I said the highest authorities. (Great laughter.) Continuing, Mr. Crosfield said the remedy that was possible was by refining in bond. If that remedy was carried out, the field would be fair to all. But to induce foreign Governments to apply that remedy, they must be armed with some weapon, and the weapon necessary was a countervailing duty.

In reply to a question, Mr. CROSFIELD explained that it was not suggested that the countervailing duty should be permanent. It would only be put on such countries as gave bounties, and when the the bounties ceased the duty would drop to the ground.

Mr. Meade-King's amendment was then put to the meeting against the motion, and was lost by 31 votes to 8.

On the motion of Mr. SPARROW, the words "In case of failure of negotiations," were substituted for the words "Should the Government see fit," and, with this alteration, the resolution was carried by an overwhelming majority.

The following letter was addressed to the promoters of the requisition by an ex-president of the Chamber of Commerce,—

Liverpool, 29th of June, 1887.

I am unable to sign your requisition, as I am but rarely able to attend the meetings of the Chamber of Commerce, such being usually held on Friday afternoons, or other times when I am pre-engaged.

I should like to hear the arguments *pro* and *con* as to sugar. As a consumer I make no objection to buy at 2d. or 2½d. what in my own recollection cost 8d. and 1s., owing in part to remission of Customs duty on Colonials. I once, in 1841 or 1842, passed an entry for one hogshead Porto Rico raw sugar at 63s. per cwt. duty. Remainder of cargo was removed in bond, part for ship's stores and the bulk to Quebec, where the duty was not so prohibitive. Then the sugar trade argued forcibly against the admission of sugar grown by slave labour in competition with free English colonists, who took our goods in exchange at moderate duties, but Spanish islands refused to receive our products, and not without justification. That state of things passed, and we began to buy in the cheapest market.

Some thirty years later, as an ex-president of the Liverpool Chamber of Commerce, I submitted a proposal for sundry fiscal reforms, amongst others the total abolition of the unified and reduced sugar duty. One of the ex-presidents, since Mayor of Liverpool, and a West India merchant, was shocked at such a radical suggestion, but Mr. Lowe took off half at a bite, and Sir Stafford Northcote, some

five years after, bettered the instruction by total abolition. The West India interest, aggrieved by the supposed favour shown to beetroot sugar, again raised a great and bitter cry.

As I understand it, however, the sugar refiners and their operatives have no complaint as to cheap raw ; it is that they are competed with by over-cheap refined sugar, and they allege such cheapness arises from the German and French people paying something like £1,000,000 per annum, and that because of this English refineries are shut up. Hard, no doubt, on the owners of premises and plant, but as regard the *employés*, such of them as are Germans and Frenchmen (and you are better informed as to the proportion of foreigners to Englishmen than an outsider) they will naturally carry that technical skill which has brought them to England back to their own country. Unskilled labour will be diverted, as will disengaged and unfixed capital, to other trades, and the question will be asked, will not the nation, on the whole, be the richer by this transfer, inasmuch as the proposed subsidy of £1,000,000 paid to foreign manufacturers ensures to the benefit of consumers (1) in reduced price, (2) in increasing the manufacture of articles into which sugar largely enters ? And yet one finds it hard to see how such ruin as is spoken of at open-air meetings can be the product of even 250,000 to 300,000 tons of refined sugar, whilst 1,000,000 tons raw is entered, or double the import twenty years ago, as against trebled, or even quadrupled, or refined.

Happily the fat years have preceded the lean, and we have, at least, the satisfaction of knowing that upon the Mersey and Thames Liverpool manufacturers either hold the field or carry out their bat after a score which receives the plaudits as "well played" of the onlookers, many of whom would have no objection to a similar experience.

If I cannot hear, I shall hope to read, the debate which will, I have no doubt, be able and interesting.

To this letter of "An Ex-President," Mr. Crosfield has sent the following reply :—

I am obliged for your letter of the 29th ult., and regret that you will not be able to be present when our question comes up at the Chamber of Commerce, as I think that if you had been able to be there it is very likely that we should have been able to convert you to our way of looking at the matter.

There are one or two points in your letter which I should like to discuss with you. I had almost written "set you right upon," but concluded that you might think that presumptuous. In the first place, there never was a "unified" duty on sugar in this country. The last remnant of the duty, which Sir Stafford Northcote took off in 1874, ranged from 2s. per cwt. on the lowest class of raw sugar, theoretically supposed to contain about 66 per cent. of extractable sugar, to 3s. per cwt. on refined of 100 per cent. of sugar, with other classes between. These duties acted in no way as a protection to cane sugar, and their abolition could therefore have no stimulating effect upon beetroot.

The present position of the question seems to me to divide itself into two heads—first, the effect upon our colonial interests by the bounty given on the production of raw beetroot sugar by continental nations, which has so stimulated production as to reduce the price of

sugar below its natural cost, and consequently to restrict the natural supply from those countries best suited to the growth of sugar; and, secondly, the point upon which I, as a sugar refiner, am more directly interested, viz., the additional bounty which is given by Continental Governments on the exportation of refined sugar, the natural tendency of which is to destroy the industry of this country.

The British sugar refiner does not object to the low price of sugar, but it is of no direct advantage to him. He lives on the margin between the cost of his raw material and the price he can obtain for his production, and is not afraid of the fair competition of any nation in the world. His methods are as good as any, and the cost of his labour less than some of his competitors. He cannot, however, fight the exchequers of the great nations of Europe. Still he is not likely to give up the contest without a struggle.

Now, with regard to the employment of foreign labour. The extent of this is greatly exaggerated. I have no statistics on the subject, but I do not believe that it amounts in the three ports of the United Kingdom, where sugar refining is now chiefly carried on, to more than 10 per cent. of the total labour employed within the walls of the sugar-houses, and this number of hands is very much smaller than the total number who are more or less directly interested in the trade. The employment of foreigners is to a very great extent a question of tradition, men coming over from Germany to work for the master whom their relations have found to be good ones for many years.

You say that the supposed subsidy of £1,000,000 (the total bounty given by European nations is estimated at over £7,000,000) benefits us (1) in reduced price, (2) in increasing the manufacture of articles into which sugar largely enters. I question these advantages. Is it desirable that we should obtain our sugar even at $\frac{1}{2}$ d. per lb. cheaper than we should otherwise do at the expense of ruin to our colonies? A $\frac{1}{2}$ d. per lb. is a great deal more than the amount actually paid on the beetroot sugar actually coming into England from the Continent, and the saving per head per annum to the population of the British Isles on this estimate would amount to about 3s. (2) Would the subsidiary trades suffer, even if the price were to advance 3s. to 4s. per cwt? If the jam boiler were to have to pay even $\frac{1}{2}$ d. per lb. more for his sugar would he make less jam? Considering that jam is about half sugar, and sells at prices varying from 8d. to 1s. per lb., I should think he would not.

If it had not been that the fat years preceded the lean ones, there would have been no such agitation as the one which we are at present carrying on, for sugar refining would not have been numbered among the industries of Great Britain; but here we are, living for the present on our fat, and determined by every means in our power to obtain a fair field upon which to display our prowess as manufacturers.

I am, yours truly,

CHAS. J. CROSFIELD.

It is not surprising, and it is very gratifying, to find that this debate in the Liverpool Chamber of Commerce has led to a good deal of correspondence in the Liverpool papers. It is well for us to know what is thought by those who support a system which is admitted by the highest authority in the land to be a gross injustice upon the British sugar industry.

Mr. J. E. Tinne, representing the West India planters, writes as follows, in answer to those gentlemen who spoke in opposition to any steps being taken to abolish bounties:—

TO THE EDITORS OF THE LIVERPOOL MERCURY.

Gentlemen,—The greatest encouragement I have received in my recent endeavours to obtain an abolition of bounties is from leading articles (such as those which appeared in your columns yesterday and to-day), and from remarks made by gentlemen like Messrs. Meade-King and Bowring, who, whilst posing as free traders, are the veriest doctrinaires that ever damaged sound theory. If no better arguments can be advanced against me, mine is the winning cause.

We do *not* demand a return to protection, nor do we seek to interfere with the protective tariffs which exclude our produce from foreign countries; we merely ask for justice and an open field in free markets such as our own, and we do not understand why either colonial planters or home refiners should be exposed to a heavy penalty in the English market at the hands of foreign countries; nor do we see why, in the name of justice or free trade (which aims at the production and circulation of commodities at the lowest natural cost), consumers should seek to be supplied with an article at £2 below its natural value.

These bounties, whether on sugar, rice, or shipping, form a constant disturbing element to the stability of investment of British capital at home and abroad; and the violent fluctuations and reactions which they inevitably cause must interfere with sound trade and honest profits. The English consumer is in most cases also a producer of English manufactured goods, for which he requires a market, and for which he has found hitherto his own colonies very much his best customers.

As Sir Daniel Cooper urges, if sugar from English colonies is to enter the English market on less favourable terms than continental sugar, England cannot complain if her goods do not enter the colonies on even terms with those imported from foreign countries. And if “the interests of certain colonies are not of serious consequence to this country” (which is the insular or parochial view of some short-sighted Englishmen), then why should England object to let the West Indies, or Canada, or the Australias make their own arrangements with the United States of America and other nations? And if she does object, and the colonies are of so little value to her as producers or customers or furnishers of freight for her ships, then let the severance between us be complete, and let it come at once, before we have been destroyed by our connection with a country which has proved to us more of an unjust stepmother than a loving parent. Our ties to this country at present do us nothing but injury. You say that we are no good to you; then let us part company in as friendly a manner and as soon as possible.

You say “the whole population of Great Britain is a positive and considerable gainer by the bounty system.” I deny it, and if your readers will digest the evidence I gave before the Royal Commission on the Depression of Trade,* I think many of them will agree with me that we lose more than we gain on the balance. I am certainly surprised at your statement that the West Indies do not produce sugar equal to what you can obtain elsewhere; our grocery Demerara appears in every grocer's window, and is described in *Whitaker's Almanac* as “the finest sugar in the world, known as Demerara crystal, in its pure state the best sugar made.” Nor do I think,

* See *Sugar Cane* for 1886, page 300.

if "some colonies are distinguished for the unanimity with which they levy dues on the goods we export to them," that, taken as a whole, we shall find continental tariffs any more merciful in admitting English manufactures.

When Mr. Cobden, Mr. John Stuart Mill, Mr. Gladstone, Lord Salisbury, the *Saturday Review*, the *Statist*, the *Spectator*, the Liverpool Chamber of Commerce, and 300 trades' councils representing half a million men in Great Britain, take one view of bounties and free trade, and the *Liverpool Mercury*, with Mr. Meade-King or Mr. Bowring take the other, I prefer to be guided by the "leading authorities" in forming my opinion about bounties and free trade, and the respective advantages they confer on our own and foreign countries. Who are the "leading authorities" and on which side?

J. ERNEST TINNE.

Liverpool, 19th July, 1887.

Amongst those who are opposed to any steps being taken to do away with the bounties, are the manufacturers of jam—an industry which, it is stated, employs a larger number of workpeople than is employed in sugar refining, although the amount of wages per head is not one-third of that paid by the refiners.

The jam trade of recent times has enormously increased, and there is no doubt but that the low price of sugar since 1883 has largely helped it; and as the low price has been mainly brought about by the foreign bounties, the jam people are naturally not anxious to see them ended. The abolition of the bounties will, in all probability, be followed by a reduction in the sugar tax, for the loss now suffered from the granting of bounties would cease, and the governments would be in a position to reduce the tax, without adversely affecting the net revenue. The effect of such a reduction would be, to considerably lessen the cost of sugar to the consumer, in Germany, for instance. With sugar at a reasonable price in Europe, our jam manufacturers would very soon have to face a severe foreign competition. Although this is a consideration which is not brought forward, it has, we think, more to do with their opposition to the anti-bounty movement than any such considerations as that it is a violation of supposed free trade principles.

Messrs. Masfield & Co., of the City Preserves Works, Liverpool, have written a long letter to the Liverpool papers on the subject from their point of view. We are sorry that our space will not allow of its insertion, as also of several others *pro* and *con*.

LORD SALISBURY ON STATE BOUNTIES.

On the 22nd July a deputation waited upon the Prime Minister at the Foreign Office, representing the trade unions of London, Swansea, Accrington, Burslem, Birmingham, Bolton, Barrow-in-Furness, Manchester, Liverpool, Bristol, Cardiff, Hyde, Derbyshire, Leicester, Glasgow, Leeds, Salford, Newcastle, Sheffield, Ipswich, Nottingham, Durham, Warrington, South Shields, Carnarvon, and Dundee.

The deputation was introduced by Mr. Thomas Burt, M.P., and accompanied by Mr. Benjamin Pickard, M.P., Mr. W. Abraham, M.P., Mr. W. Crawford, M.P., and other Parliamentary representatives.

Mr. BURT, in introducing the deputation, observed that it was large and thoroughly representative, including delegates from all the great industrial centres of England, Scotland, and Wales. In 1881 the subject was before the Trade Union Congress, at which the following resolution was passed:—"That in the opinion of this Congress foreign State bounties violate every principle of free trade, and this Congress desires that every legitimate means consistent with those principles be adopted for their abolition." Mr. Burt explained that this was a free trade deputation, and that they opposed the bounty system, as they considered it opposed to the principles of free trade. The workmen of the country desired neither protection nor special privileges; they only wanted a fair field. Speaking of his connexion with the coal industry, Mr. Burt said he knew that the bounty system had an injurious effect upon that industry. Time after time workshops and factories using large quantities of coal had been closed, and the result was that the coal industry, like other industries, was in a state of very great depression. So far as this condition of things was the result of natural causes they were willing to bow to it, and to bear with patience the privations and sufferings consequent upon it; but in this instance they believed the condition of things was aggravated by unnatural and artificial means, and it was consequently much more difficult to regard it with equanimity.

Mr. J. INGLIS (Glasgow) said they did not object to foreign competition conducted upon natural grounds, and would endeavour to meet it with all their intelligence, industry, and perseverance, but when they saw that certain industries were bolstered up in an abnormal way by the bounty system they thought it was desirable that some effort should be made by the Government to remedy the injurious effects which such a system created among the working classes. In Glasgow they had two large mechanical engineering establishments whose speciality was the manufacture of machinery for carrying on the sugar industry, but since the bounty system had been introduced

those establishments had been nearly at a standstill, putting out of work about 800 or 900 skilled operators, while two other establishments partially connected with the making of machinery for the sugar industry had had to stop that branch of their business and take up the manufacture of machinery for other industries. The neighbouring town of Greenock was also suffering from the bounty system so much that the Harbour Trust had had to suspend payment and meet its creditors. He urged the Government to take some steps, consistent with the maintenance of the principles of free trade, to secure the abolition of the bounties.

MR. COUNCILLOR GRAINGER (Birmingham) said the deputation was not got up either directly or indirectly to say one word against the adoption of free trade as now existing in this country, but to say something against the terrible abuse of free trade resulting from the bounty system adopted by foreign Governments. They were quite content to take free trade, knowing, nevertheless, that it did hamper the trade of this country in some respects in our dealings with other nations; but after all he was confident that even in that respect the manufacturers and artisans of this country could hold their own and generally assert their supremacy. He was connected with Greenock many years ago, and knew that the merchants of that town had founded private companies and must have spent at least half a million of money in introducing sugar-refining and shipbuilding into the district, and thus made Greenock for many years one of the most important centres of industry on the Clyde. But in consequence of the bounties the dock authorities found their docks were not used, and the ships with cargoes of sugar did not come in as they did, while the depression in the shipbuilding trade had been intensified by foreign Governments subsidizing ships built in their own countries.

Several other members of the deputation having spoken,

LORD SALISBURY, in reply, said,—I need not say that this is a subject which I have always felt to be of the deepest moment, raising issues of great importance, and perhaps introducing us to other very wide controversies which are likely to be raised in this country. I feel myself that nothing that has been said to-day with respect to the injustice of these bounties upon the English workman has been said too strongly. (Loud cheers.) It is quite natural—in fact, I should be very much surprised if it were not so—that very great indignation should exist at seeing that our own eagerness in the principles of free trade is, as it were, turned against ourselves (hear, hear), and that by what has been fairly described as an illegitimate conspiracy we are driven out of the industry of our own markets (hear, hear), and undoubtedly if the subject itself is of deep importance and would of itself impress itself upon our minds, it would be very much more strongly brought home to us by the presence of so very influential

and representative a deputation as that which I see before me to-day. I think you called it a unique deputation, and I think that was a justifiable phrase. (Hear, hear.) But I think Mr. Shipton will hear me out that when this was first proposed to me I called his attention, through the gentlemen who communicated with us, to the circumstances of the time, and prepared him for the fact that I should not be able to give any explicit or definite answer; and the reason is that we are in communication with foreign Governments with a view to summoning a conference upon this question (loud cheers), and therefore you will readily understand that I could not go into details discussing the action of these various Governments, or the various modes in which the thing is to be dealt with, without in some degree prejudicing and injuring the action of our own representative whenever the Conference should meet. I therefore will ask you to be content with an assurance which I can give with the greatest sincerity that I regard this matter as one of the greatest importance, and that no exertion shall be wanting on our part to bring about such a thing as you desire. (Loud cheers.) But will you allow me to go one step further and to commend something to your earnest reflection? I was very much struck in listening to speaker after speaker to notice that, though they spoke with a clear appreciation and discernment of the gravity of the evil, they always stopped short when the moment came to suggest the nature of the remedy. I think Mr. Shipton was the only one of the speakers who a little went beyond and suggested applying to Parliament if necessary, but that was in the whole course of this discussion the only indications of a remedy that I received. Now, what I want to impress upon you is that this is not in the least an abstruse question. There is no difficulty about it--no difficulty, that is to say, in the way of understanding it. The difficulty is that you have to reconcile two conflicting currents of public opinion. There is the current in favour of certain economical doctrines into which I will not enter, and there is the current of that natural discontent and indignation at the existing state of things which you represent here to-day. But I want you not to imagine that you can slur over this difficulty by the mere use of general words. We politicians are too apt to deceive ourselves in that way; but working men who have to face the facts of life as no other men have to face them probably are less liable to be taken in and carried away by general phrases, and they will want some specific application of them. Now, what I want you to consider is this--that you are dealing with an adversary who is doing you wrong. If a man hits you, you have two ways of dealing with him. You may expostulate with him and point out to him the extreme imprudence and wickedness to himself of hitting you as he is doing, if you think that that mode of action is not likely to lead to a satisfactory and to a sufficient result, you may act to him as he is

acting to you. (Laughter.) That is the whole philosophy of this question. (Laughter and cheers.) Now, gentlemen, I do not wish to go further into it, but I want you, as somebody has said, to clear your minds of cant and distinctly to understand what the issue is. I have no doubt that when the public opinion of England, and especially of the working class of England, has made up its mind on this matter we shall act with dignity, and we shall act with effect. (Loud cheers.)

Mr. Burt having thanked the Prime Minister, the deputation withdrew.

The *Morning Post*, in its leading article of July 27, makes the following statement:—"Heretofore the men who have carried on the struggle have been, rightly or wrongly, deemed to be Protectionists or, at least, Fair Traders in disguise, and as such have been severely handled by the faithful followers of Cobden. The men who waited upon Lord Salisbury on Tuesday are open to no such imputations,"—to which Mr. George Martineau replies:—

TO THE EDITOR OF THE MORNING POST.

SIR,—In your editorial remarks on the recent deputation of representatives of the Trades Unions to Lord Salisbury it is assumed that those who have hitherto urged the suppression of this system of foreign protection on British markets have done so from a Protectionist or Fair Trade point of view. I wish to assure you that this is not the case, as may be clearly seen by referring to the evidence before the Select Committee of 1879, and to all the correspondence with official departments or discussion in the Press. The *Spectator* went into the matter very fully, and declared that "a duty to countervail a bounty is not only consistent with Free Trade, but positively conceived in the interests of Free Trade." The Select Committee of the House of Commons, which also sifted the question to the bottom, decided that a countervailing duty was not in any sense of the term Protection. The request of the deputation to Lord Salisbury to use all legitimate means "consistent with the principles of Free Trade" is therefore a perfectly practical and sound proposal.

I am, sir, your obedient servant,

GEORGE MARTINEAU.

21, Mincing-lane, July 26.

THE EHLMANNITE PROCESS.

Mr. L. Ehrmann, who has recently returned to Europe from visiting the West Indies, has written the following letter to the *Demerara Argosy* :—

SUGAR MANUFACTURE.

Dear Sir,—When I sent you a note for the *Argosy*, 10th inst., I omitted to thank your correspondent for having called the attention of the planters to the value, as a manure, of the residues of the Ehrmannite process. This point is a very important one, and I shall be pleased to draw to it the attention of planters by some figures.

The lime waste from sugar factories contains only a very small percentage of phosphate of lime, from the action of the lime on the soluble phosphates contained in the natural juice.

A sample of the skimmings from the top of clarifiers, in Ehrmannite process, analysed as follows :—

Moisture	66·
Organic matter and sugar	25·08
Mineral do.	8·27
Silica	0·63

containing nitrogen 0·80 equal to ammonia 0·97 ; phosphoric acid 2·71 equal to tribasic phosphate of lime 5·81.

Two samples of cakes from filter process :—

Moisture	37·	....	42·
Organic matter and sugar	35·80	....	34·30
Mineral do.	26·40	....	23·
Silica	0·80	....	0·70
Nitrogen, containing.....	0·56	....	0·56
equal to Ammonia.....	0·67	....	0·67
Phosphoric acid	7·85	....	5·30
equal to Ammonia.....	17·13	....	11·56

These skimmings and the filter process cakes contain with the organic and albuminoid matters, the ferments of the cane juice.

The ferments are organic matter having a great resemblance to albuminoid matter, they are soluble in water, and if lime and phosphoric acid are added to the liquor, the precipitate collects with the phosphate of lime, the ferments, the organic and the albuminoid matters, that subside to the bottom of the clarifier or rise to the top of the liquid, according to the method of heating the juice.

We see that the residues of Ehrmannite process are organic matter mixed with phosphate of lime in the best form as food for the plant ; and they are composed of the same elements or constituents that the cane has taken from the soil and the atmosphere, besides an addition of very finely precipitated phosphate of lime.

The best way to utilize the skimmings and cakes from filter presses or bag presses is to mix them every day with the ashes from the furnaces, coral sea sand and shells (when procurable), and burnt earth. The large quantity of sub-oxydised iron in Demerara soils gives a great importance to the use of burnt earth as improving largely the quality of the soil.

Here are the analyses of ordinary soil, and of the same burnt soil (red earth), from another colony.

	Ordinary Soil.		Burnt Soil.	
Water and organic	4.700	....	0.650	
Alumina and Oxy. of iron	13.	....	14.450	
Lime	0.360	....	0.980	
Magnesia	0.250	....	0.320	
Oxyde of sodium	0.048	....	0.127	
Potash	0.022	....	0.249	
Phosphoric acid	0.089	....	0.230	
Insoluble in acid	81.450	....	70.500	

The quantity of assimilable potash has been increased ten times, lime five times, phosphoric acid two and a half.

The refuse of Ehrmannite process gives not only a good manure for the growing of the cane, but it also contains the most favourable elements for producing more crystallisable sugar, and decreasing the quantity of uncrystallisable sugar, too often due to an excess of ammonia. All the Ehrmannite used for defecating cane juice is recovered as manure in the best form.

The following data from experiments I made last year in Mauritius will fully demonstrate the value of the residue. The experiments were made to improve the quality of the cane juice in a part of the island where the juice was always rich in glucose ; the canes being good and very healthy. I give only the analyses of juice in crystallisable and uncrystallisable sugar, as this is the more important :—

- A and A'—Complete Manure.
- B and B'— do. with 50 per cent. phosphatic gypsum.
- C and C'— do. with 50 per cent. Packard's super-phosphate 17 per cent. soluble phosphoric acid.

B and B'—Excess of lime (sulphate and phosphates).

C and C'—Excess of phosphoric acid soluble.

A B C—Analysis of unmatured canes.

A' B' C'— do. of fully ripe canes.

Per Litre.	A.	B.	C.
Crystallisable sugar	148.93 ..	152.70 ..	154.44
Uncrystallisable sugar	8.99 ..	7.87 ..	7.20
Uncrystallisable % crystal	6.04 ..	5.02 ..	4.66
Per Litre.	A'.	B'.	C'.
Crystallisable sugar	185.89 ..	193.20 ..	199.37
Uncrystallisable sugar	6.74 ..	5.48 ..	5.84
Uncrystallisable % crystal ...	3.62 ..	2.836 ..	2.93

These figures show the very important action of lime and phosphoric acid when combined, as increasing the quantity and the quality of sugar, the quantity of crystallisable being increased from 148.99 to 199.37, *i.e.*, 18.48 gr., or 7.2 per cent.; and the quantity of "quotient glucosique" being lessened 0.69.

I have not in my notes the analysis of the soil, but, like Demerara soils, it was very poor in lime and phosphoric acid, and containing a large amount of iron and alumina. In the above experiments it may be seen that soluble phosphoric acid (without excess of lime) has nearly the same quotient of glucose as the gypsum; so, if it had been combined with all the quantity of lime required to make tribasic phosphate of lime, the result would have been far better.

The conclusion is that for soils like Demerara soils the use of chemical manures containing soluble phosphates, such as superphosphates or dissolved guanos, is a great mistake, and a loss of money; as planters do not get all the profit of the phosphoric acid they have paid for. A great part of the phosphoric acid, for want of lime immediately assimilable in the soil, turns insoluble, and being phosphate of iron and alumina is nearly lost for the plant. The best manure for the Demerara clay soils is precipitated phosphates; they give to the plant lime and phosphoric acid ready for assimilation. Lime is to plants as common salt is to animals; when lime is not sufficient in quantity for the plant, the development of the plant is not complete, and also the formation of sugar in the cane. Lime is also necessary for the nitrification of organic matter in the soil. But this question would require a special note, and would take a too long space in your columns. There is another and more important question of loss of sugar alluded to in the letter of your correspondent, which I want

to put before the eyes of the planters. This is the question of sugar cane being inverted to glucose by acid in the different stages of the fabrication of sugar, under certain circumstances. I don't allude to ferments, as they are, by the use of Ehrmannite, separated with the skimmings; so the only loss of sugar may come from acidity.

I would like to enter fully on the subject; it is so full of interest to the colony; but I shall here use only a few figures to show the importance of the question, and the advantage of phosphoric acid, in a special form, over other acids. I mean purified phosphoric acid as Ehrmannite; for many other forms of phosphoric acid which have been tried and have failed were cheap and impure phosphoric acid made for manure, and noxious to cane juice, producing loss of sugar. The inverting power of acids for sugar is as follows:—

Tartric Acid	13·8	Sulphuric Acid	84·2
Phosphoric Acid.....	26·9	Chlorhydric Acid	100·
Oxalic Acid	54·5	Nitric Acid	100·1

Phosphoric acid, a mineral acid, has less invertive power than the oxalic, an organic acid. The danger of inverting the sugar by phosphoric acid is much less than by sulphurous acid turning so easily into sulphuric acid during the fabrication, as it may be seen from the annexed figures of good and of bad fabrication I take from many others. Usines A, A' and B are without triple effet, and not much care is taken in the fabrication, making white sugar by a great excess of sulphur. C is with triple effet and good management making white sugar. A, A', B, and C use only sulphur process and lime.

A	Juice from the mill, 11·3 Beaumé—Glucose % crystal-		
	lisable sugar		2·40
	Juice from open battery, 20° Beaumé		10·93
	Do. do. 23° do.		14·48
Sugar destroyed, 12·08 % of crystallisable sugar.			

A's juice from the mill, 10·5 Beaumé—Glucose % crystal.	3·10
Same juice from open battery, 18·9 do. do.	8·37
Loss of sugar, 8·37 %.	

B's juice from the mill, 9·4, B.	do.	do.	6·50
Same from open battery, 13·8, B.	do.	do.	10·76
„ „ „ 18·6, B.	do.	do.	11·52
Loss of sugar, 5·02 %.			

C's juice from the mill	.. .. .	5.48
„ „ clarifier	.. .. .	6.64
„ „ eliminator	.. .. .	8.02
„ „ triple effet third pan	.. .. .	8.14

Loss of sugar, 2.66.

The loss is double here represented, as sugar turned into glucose prevents the crystallisation of about its weight of sugar: so the total loss before the juice goes to vacuum pan was from 5.32 per cent. to 24.16 per cent. "*Et nunc erudimini*," I give as comparison the figures C¹ C² of the same estate C, same machinery, but using Ehrmannite, purified sulphurous acid by carbonate of baryta, and lime; the loss of sugar is largely decreased, and the sugar much more beautifully white.

C ¹ . Juice from the mill,	11.1 Beaumé..	} Glucose % {	3.18
„ „ clarifiers,	10.1 „		3.24
„ „ eliminator,	11. „		3.24
„ „ triple effet,	27.2 „		3.32
C ² . Juice from the mill,	10.1 Beaumé		5.98
„ „ clarifiers,	10.1 „		6.10
„ „ eliminator,	11.1 „		6.10
„ „ filters,	11.1 „		6.14
„ „ triple effet,	26.4 „		6.16

Loss of sugar, 0.18. Total loss, 0.36.

These figures require no comment. The losses in syrups vary in the same proportion.

Several times, when cleaning the triple effet and vacuum pan, explosions of gas occurred in Mauritius, by mixture of sulphuretted hydrogen with the air. Sulphuretted hydrogen cannot be produced unless sulphurous acid has turned into sulphuric acid and sulphates, which, being deoxidised by organic matter of syrup, produced sulphides and sulphuretted hydrogen. So when the juice is treated by sulphur only, it is not purified; large quantities of sulphur compounds remaining in the juice, and spoiling molasses and rum. When the juice is purified by phosphoric acid, the phosphoric acid and phosphates are precipitated before boiling, and the juice is really purified; of course giving larger quantity of sugar, and beautiful sugar. When glucose is not existing in very abnormal quantity in the canes, and not produced in the fabrication, the sugar is very hard, well cured in the centrifugal, and giving a fair return in first jet; from 10 to 15% more than by the other methods.

Few words only to terminate. I want to allude to a very important question for the colonies. The production of sugar is so enormous that we, sugar planters, have to look for other uses. All the sugar cannot go to the consumer direct, or to the refinery, without keeping the prices very low. Dried grapes are each year introduced into France for making wine;* and large quantities are also used in other countries; first sugars when fermenting give pure alcohol, glycerine, succinic acid, ethers, with good flavour, and very healthy, but on many occasions it cannot be used, being much too expensive; and when 2nd and 3rd sugars are used the result is bad. No doubt with juice well purified, and also good purification of molasses, good muscovado and concrete 2nd and 3rd sugars could be largely used for making wine and beer, if the flavour of the sugar is good. A peculiarity of the Ehrmannite process is that the sugars have a very good taste, and the flavour of the cane juice. If we could sell purified 2nd and 3rd sugars to wine and beer makers, we could get some profit from the glucose, as they want it; but the refiners not only do not pay for it, but make a reduction in price.

I regret being obliged to leave the colony by this mail, and I take the opportunity of the *Argosy* to give my best thanks, to the press, and to many planters and other gentlemen to whom I have had the pleasure to be introduced; wishing also to the colony pleasanter times in the future, and a good remuneration for the intelligence and enterprising activity displayed by its colonists.

Believe me,

Yours very truly,

L. EHLMANN, F.C.S.

Tower Hotel, 20th June, 1887.

MESSRS. HENRY TATE & SONS.

The following resolution was unanimously carried at a crowded public meeting of over 900 working men, held on July 1st, at Silvertown, E., under the presidency of Mr. James P. Muir, manager for Messrs. Henry Tate and Sons, Thames Sugar Refinery:—"That this meeting of working men engaged in the sugar trade protests against the attack made upon the industries of this country and its colonies by the foreign bounty system; it denies that working men as a body desire to be supplied with any commodity below its natural free trade price, and it emphatically calls upon our Government to take such steps as may be found necessary to effectually stop foreign Governments from crippling or destroying an important industry."

* France is paying to Greece £2,000,000 each year for grapes

LOUISIANA SUGAR CROPS.

Since our last issue we have received from Mr. Alcée Bouchereau "The Louisiana Sugar Report for 1886-87," containing certified data, obtained by a personal visit to each plantation. We learn from the Introduction that this report is the nineteenth of the series commenced by Mr. A. Bouchereau's father.

The following extracts are taken from the report :—

"The poor result we attribute to the killing freeze of January, 1886, and the protracted cold wet weather; then a rainy spell from May to August, greatly interfering with the cultivation and laying by of the crop; finally a long drought from August to October; from this time on the weather was most favourable. . . . Cane cutting and sugar making were started about the 15th (October), although some started a few days earlier, but the mass of the planters started November 1st, owing to the backwardness of the season which prevailed from early spring until this month. . . . The cane yielded well as a rule, and the juice improved in saccharine qualities as the season advanced. . . . The cane was very ripe, but owing to its small size the cutter passed over the land with unusual speed. We cannot recall any year when so small a stream of juice issued from a good feed of cane. . . . Grinding was wound up on every plantation in December. . . . Those who boasted of good growths of cane did not succeed in the extraction of the amount of juice which its size promised, and those who exceeded 50 per cent. of last year's crop had reason to congratulate themselves, for we have not had so bad a season for the cultivation of cane in the last fifty years."

"In regard to the growing crop we are delighted in having the pleasure to state that it is in a highly prosperous condition, and if nothing happens to darken the outlook, there is no doubt that the crop will be large, perhaps the largest since the Civil War."

With respect to the future of this industry Mr. A. Bouchereau says:

"With the organization of agricultural societies throughout the parishes, the experiment station, the reduction of European sugar bounties, and a national law on food adulteration, *and a sensible protective tariff* (here is a goodly number of conditions; the italics are our own), we can venture to say that the sugar industry will be made remunerative. Planters will work with more enlightenment, and no doubt will apply science to field work, as our best competitors have done and are still doing, producing richer sugar beet every year. They will also abandon the use of this antiquated apparatus, and adopt all of the latest improved machinery, in the manufacture of the staple; thereby producing larger crops with more economy, and driving their competitors out of the market (!!) We can do it, if we put our heads to it and persevere."

This report contains a list of the Louisiana planters and sugar plantations, with the production of sugar of each, and the kind of sugar. The number of sugar planters is just about 1,000, so that last year the average production of each was not quite 82 tons.

Mr. Bouchereau gives a very interesting table, showing each year's crop for the past 62 years, which we give on the next page.

LOUISIANA SUGAR CROPS, 1823-1826.

Year.	Hhds.	Tons.	Year.	Hhds.	Tons.
1823	30,000	16,800	1855	231,429	129,600
1824	32,000	17,920	1856	73,296	41,045
1825	30,000	16,800	1857	279,697	156,640
1826	45,000	25,200	1858	362,296	202,885
1827	71,000	39,760	1859	221,840	124,230
1828	88,000	49,280	1860	228,753	128,101
1829	48,000	26,880	1861	459,419	257,275
1830	....	....	1862	No data.	....
1831	....	....	1863	76,800	43,008
1832	70,000	39,200	1864	10,387	5,816
1833	75,000	42,000	1865	18,070	10,119
1834	100,000	56,000	1866	41,000	22,960
1835	30,000	16,800	1867	37,647	21,082
1836	70,000	39,200	1868	84,250	47,180
1837	65,000	36,400	1869	87,090	48,770
1838	70,000	39,200	1870	144,881	81,133
1839	115,000	64,400	1871	128,461	71,942
1840	87,000	48,720	1872	108,520	60,771
1841	90,000	50,400	1873	89,498	50,119
1842	140,000	78,400	1874	116,867	65,445
1843	100,000	56,000	1875	144,146	80,722
1844	200,000	112,000	1876	169,331	94,825
1845	186,000	104,160	1877	127,753	71,542
1846	140,000	78,400	1878	213,221	129,404
1847	240,000	134,400	1879	169,972	93,505
1848	220,000	123,000	1880	218,314	122,256
1849	247,923	138,836	1881	122,982	68,872
1850	211,201	118,273	1882	241,220	85,083
1851	237,547	133,026	1883	221,515	124,048
1852	321,934	180,283	1884	170,431	95,441
1853	449,324	251,621	1885	231,290	129,522
1854	346,635	194,115	1886	145,968	81,743

In reducing the hhds. to English tons, we have taken the hhd. as equivalent to 0.56 of a ton, or an average weight of 1250lbs.

The average production of the past ten years (1877-1886) is 100,141 tons; for the ten years previous to the war (1852-1861) the average production was 166,373 tons.

GREENOCK HARBOUR TRUST AND THE SUGAR BOUNTIES.

The Greenock Harbour Trustees have transmitted the following petition to Parliament on the question of the sugar bounties, which Mr. Thomas Sutherland, M.P., has presented in the House of Commons:—

To the Honourable the Commons of the United Kingdom of Great Britain and Ireland, in Parliament assembled.

The humble Petition of the Trustees of the Port and Harbours of Greenock, under their Corporate Seal,

Sheweth—

1. That your petitioners are the Trustees of the Port and Harbours of Greenock, incorporated under the Greenock Port and Harbours Act, 1866, and, as such, the property, management, and control of the Port and Harbours of Greenock are vested in, held, used, and enforced by them

2. That your petitioners, under successive Acts of Parliament, were invested with borrowing powers to the extent of £1,800,000, and have already borrowed money and constructed an extensive system of harbours, docks, warehouses, and other works, representing a value of upwards of £1,500,000.

3. That your petitioners have for a long period of years derived a substantial proportion of their revenue from dues on vessels bringing sugar, and from dues on sugar imported and warehoused at Greenock to supply the large trade of sugar refining, which has hitherto been the staple trade of the town, as well as from dues on vessels and from dues on refined sugar going outwards from Greenock.

4. That your petitioners have for some time observed with anxiety the precarious condition of this national industry through the unjust and injurious operation of foreign bounties, whereby a large number of sugar refineries at Bristol, Dublin, Southampton and London, as well as in this town, have been closed.

5. That your petitioners deplore the loss, from the same pernicious cause, of a large and lucrative import and export traffic with the cane sugar producing West India Islands, with which the port of Greenock, her merchants, and refiners were in years past closely connected; but more especially is the attention of your petitioners now directed to the critical condition of the local sugar refining industry, which, in consequence of the long-continued and the late further-increased Continental bounties, is still more seriously prejudiced and threatened with extinction.

6. That your petitioner, as trustees of a large public corporation, are closely identified in interest with this long-established trade of sugar refining, depending thereon for a substantial proportion of revenue, both directly and indirectly, and regard the present aggravated and threatening aspect of matters with apprehension and alarm.

Your petitioners therefore humbly pray that in the cause of free and unfettered trade your honourable House will take immediate and vigorous action, by such means as may be deemed most effective, to neutralise and counteract these injurious sugar bounties, and so avert a calamity of far-reaching commercial consequences that must ensue if the hostile policy of foreign Governments, in the form of sugar bounties, is permitted to continue unchecked, and to strike longer at one of the most valuable national industries, and the staple trade of this town and seaport.

And your petitioners will ever pray.

(Signed,) ROBERT SHANKLAND, Chairman.

FOREIGN COMMENTS UPON THE PROPOSED SUGAR CONGRESS.

The *Deutsche Zuckerindustrie* says:—"We hear from London, that the English Government has quite decided to introduce countervailing duties in the case of those countries which are unwilling to agree to the abolition of the premiums.

"The German sugar industry can only desire that this decision may be carried into effect, for by the new law (not as yet promulgated) the premiums are, on the one hand, not only the lowest in comparison with those of all other countries, but, on the other hand, so very low, and bound up with such a clumsy system of taxation of the beets, that their total abolition can only be a question of time, and, indeed, of no very long time. Germany is, therefore, in a position to agree at once to the proposition for a total abolition of the premiums, and thus to secure for herself the most important market in the whole world—England.

"We believe however, that Austria, Belgium, and Holland will also give up their premiums, so that there would then only remain France, who will not be very willing to lose the English market. In consequence of this, the language of the *Journal des Fabricants* or rather of Mr. B. Dureau has quite changed its tone; instead of the sovereign refusal to take any part whatever in the Congress, which we have had hitherto, we read in the leading article of the 13th instant.

"We cannot disguise from ourselves that we are irresistibly tending to an international sugar convention, having for its object the reduction or abolition of the sugar premiums."

The article in the *Journal des Fabricants* closes with the following serious warning, of which the German manufacturers also will do well to take note:—

"The best protection consists in the reduction of the cost of production, and the sugar industry will only be really in a strong position, on the day when it can dispense with the humiliating and uncertain protection which is afforded by legislation."

Referring to the remarks of the *Journal des Fabricants* just quoted, the French *Sucrerie Indigène* says:—

"These last words seems to us to go too far, and to ignore in a most ungrateful manner the benefits of the law of 1884; but after all

we must make no mistake about it, the future, and the near future will bring with it the abolition of premiums with us as with our competitors, and we must be ready for the struggle. Manufacturing processes are rapidly improving, progress is constant, but what we have most to fear, is that cultivators will not be able to go on if the legal yield is to be indefinitely extended from year to year and a continually richer beet be required in consequence.

If we are moving in the direction of the abolition of bounties, it would be useless and even dangerous to go on with this indefinite increase in the saccharine contents of the beets.

It is evident that we have not nearly got to the end of the sugar question, and that the economical problems which surround it and are created by it are far from being solved, and their daily changing aspect renders solution difficult."

A late number of the *Journal des Fabricants* says:—"We believe that, when the day comes when the foreign governments, united together, with Germany and England at their head, declare themselves ready to abolish the premiums, and are able to prove that they have already reduced them to an insignificant figure—on that day it will be very difficult for the French Government to refuse to come to an understanding. But we really cannot forget that it is only since 1884 that the French manufacturers have been enjoying certain artificial advantages, and that it was only to avoid the ruin with which they were threatened by their bounty-armed German, Austrian, and other competitors, fortified by more than thirty years protection of the most efficacious kind, that they were obliged to demand the application of that *régime*, the benefits of which they are only to-day receiving. Our competitors too easily forget that they have had a considerable start of us. We really cannot lay down our weapons until we have got on a level with them."

The *Deutsche Zuckerindustrie* further says:—"As may be gathered from these remarks in both the French papers, they ask for time for their industry, and this will be more easily obtained, and granted in a greater degree, if France takes part in the Congress, than if she stands on one side and declines to participate. We also regard the request as perfectly justified in so far as this, that France cannot be asked at once to give up all premiums.

"On the whole it appears to us, that this is not the aim which the Congress should first of all have in view. It must be remembered,

that the universal introduction of the tax on manufactories or on the consumption aimed at in former international negotiations is by no means sufficient to put an end to all premiums; the latter may exist in a latent form in the calculations of the different raw sugars into refined, in the ratios of the co-efficients, the standard samples, in the manner of sampling, and, *last not least*, in fraudulent action.

“As we have already pointed out before, what mainly contributed to the non-success of the Convention of 1864, was the inequality of the rate of taxation in the countries which were parties to the Convention, and hence we consider it as the first task of the Congress to bring about the greatest possible equality in the taxation, and this in the direction of reduction, because, no matter where the premiums may lie concealed, the gain from them diminishes in proportion with the reduction of the tax. Such a universal reduction has become much easier through the increased receipts from the sugar tax in those countries where premiums are in force, an increase which will be continued in the campaign shortly commencing.”

The following telegram, dated July 27th, is from Berlin:—“The attitude of the British Government on the sugar bounty question and the progress of the anti-bounty movement in England are closely observed here. In Germany international action on this subject would be welcomed. The Government is favourable to the abolition of sugar bounties, and it has openly said so; but it is an inevitable condition that all the countries concerned shall adopt common measures. As matters are, home consumers suffer seriously and foreign buyers of German sugar benefit at the expense of the producing country. Though international action is desired, it is not believed that it will at present be taken. Probably there will be more difficulty with France than with Austria; but should either country decline to join the rest, the whole scheme would necessarily fail.

It is stated that the Vienna Foreign Office has informed both the Austrian and Hungarian Ministries of Commerce of the Note which the English Government has addressed to it on the subject of a Conference concerning the sugar bounties. The Austrian Government consents in principle to the abolition of those bounties, and will in the Conference adopt an attitude in accordance with the common decisions of Austrian and Hungarian Finance Ministers. The Austrian Reichstath, which last Session had a Bill on the sugar tax under its consideration, was also of opinion that any International action for abolishing such bounties deserved support. Germany, Belgium, and Holland are likewise favourable to their abolition, and only France appears to be opposed to the proposal.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO JUNE 30TH, 1886 AND 1887.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1886.	1887.	1886.	1887.
	Cwts.	Cwts.	£	£
Germany	2,589,398	3,435,170	1,693,263	1,844,203
Holland	173,325	202,094	114,122	109,547
Belgium	302,931	467,958	256,295	244,418
France	6,141	17,172	3,627	10,318
British West Indies & Guiana	1,198,440	1,473,304	987,362	1,050,826
British East Indies	380,143	174,867	206,868	79,732
China and Hong Kong	44,226	312	26,393	201
Mauritius	167,164	58,640	114,661	30,160
Spanish West India Islands	5,000	104,466	4,250	62,800
Brazil	372,859	384,722	254,594	202,345
Java	3,020,247	2,357,828	2,291,448	1,537,685
Philippine Islands	192,772	153,643	115,123	70,020
Peru	331,869	199,855	245,857	122,081
Other Countries	398,564	295,459	292,327	166,732
Total of Raw Sugars ..	9,273,079	9,325,490	6,606,187	5,531,068
Molasses	115,400	172,246	38,580	52,641
Total Raw Sugars	—	—	6,644,767	5,583,709
REFINED SUGARS.				
Germany	827,617	1,404,027	714,884	1,075,283
Holland	524,584	686,012	471,513	531,729
Belgium	51,713	96,278	49,486	78,631
France	270,437	756,020	255,084	563,050
United States	562,490	657,043	507,964	524,283
Other Countries	653,102	9,164	547,734	6,617
Total of Refined	2,889,943	3,608,544	2,546,665	2,779,593

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	69,045	57,848	49,523	30,955
Belgium	23,869	21,460	17,518	13,002
France	26,824	22,101	20,856	13,586
Portugal, Azores, & Madeira	44,856	52,685	33,847	29,927
Italy	35,310	42,711	25,866	25,946
British North America	6,118	8,000	6,173	4,954
Other Countries	165,188	156,679	130,605	104,351
Total	371,210	361,484	284,388	222,721

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of June compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1884, 1885, and 1886, distinguishing the quantities of "Lumps and Leaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"LUMPS AND LEAVES."						"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			June	June	June	Monthly Average.			June	June	June	Monthly Average.			June	June	June
	1884	1885	1886	1887	1888	1889	1884	1885	1886	1887	1888	1889	1884	1885	1886	1887	1888	1889
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France.....	2737	2035	1462	1334	1347	1349	1621	546	2688	4965	476	809	4358	2581	4150	6299	2323	2158
Holland	3580	4247	3508	3309	3798	4325	1948	1555	1428	1907	1383	1705	5528	5802	4636	5716	5151	6030
Germany & Austria ..	552	956	990	1745	971	1315	2380	2859	6634	9055	2271	5213	2982	3315	7024	11700	3242	6528
Belgium	183	214	344	516	292	268	151	116	113	285	123	44	334	330	457	801	355	252
United States	962	722	854	571	1615	140	3339	10654	5078	4903	22542	1220	4348	11376	5032	5474	24157	1369
Russia .....	..	..	..	5	..	..	..	..	3412	71	..	..	..	..	3412	76	..	..
Other Countries .....	..	..	..	..	..	..	121	12	9	..	1	11	121	12	9	..	1	11
Total	8014	8174	7158	7980	8433	7337	9607	15742	19362	22086	26796	9011	17621	23916	26520	30066	35229	33391

SUGAR STATISTICS—GREAT BRITAIN.

TO JULY 23RD, 1887 AND 1886. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1887.	1886.	1887.	1886.	1887.	1886.
London	84 ..	125	172 ..	162	180 ..	196
Liverpool ..	90 ..	115	144 ..	137	157 ..	154
Bristol	4 ..	8	35 ..	33	36 ..	32
Clyde	53 ..	69	124 ..	126	142 ..	129
Total ..	231	317	475	458	515	511
	Decrease.. 86		Increase.. 17		Increase.. 4	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. TO JUNE, 1887 AND 1886.

	STOCKS.		DELIVERIES.		IMPORTS.	
	July 1st.		In June.		In June.	
	1887.	1886.	1887.	1886.	1887.	1886.
New York	160 ..	128	61 ..	80	88 ..	90
Boston	20 ..	23	18 ..	17	18 ..	21
Philadelphia. . . .	5 ..	5	13 ..	11	13 ..	13
Baltimore . . . . .	..	..	..	..	..	..
Total.	185	156	92	108	119	124
	Increase.. 29		Decrease .. 16		Decrease .. 5	
Total for the Year	—	—	625	552	707	650

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, July 14th, 1887.

FAIR REFINING.	960/o CENTES.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
July 14, 1887.—4 7-16c.	5 3-16c.	5½c.	5½c.	Jan. 1, 1887—102,279 tons.
July 15, 1886.—4½c.	5½c.	6 3-16c.	5 11-16½c.	Jan. 1, 1886—57,328 tons.
July 16, 1885.—5½c.	6½c.	6 9-16-½c.	6½.	Jan. 1, 1885—89,186 tons.
July 17, 1884.—5c.	5 15-16c.	6½c.	6-4c.	Jan. 1, 1884—60,900 tons.
July 19, 1883.—6 11-16c.	7½c.	8 15-16c.	8½c.	Jan. 1, 1883—50,297 tons.
July 20, 1882.—7½c.	8 1-16c.	9½c.	8½c.	Jan. 1, 1882—43,927 tons.
July 21, 1881.—7½c.	8½c.	9½-10c.	9 7-16-½c.	Jan. 1, 1881—66,999 tons.
July 15, 1880.—7 11-16c.	8½c.	9½-10c.	9½-½c.	Jan. 1, 1880—63,558 tons.
July 17, 1879.—6½c.	7½c.	8½c.	8½-¾c.	Jan. 1, 1879—50,773 tons.
July 18, 1878.—7 3-16c.	8c.	9½c.	9½-¼c.	Jan. 1, 1878—48,230 tons.
July 19, 1877.—9½c.	10½c.	11½c.	11½c.	Jan. 1, 1877—26,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
30TH JUNE, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
238	155	46	76	53	18	586	738	733

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
30TH JUNE, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
1249	492	50	399	193	342	2725	2393	2599

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP,
OF THE THREE PREVIOUS CAMPAIGNS.

(From *Licht's Monthly Circular*.)

	1887-88.	1886-87.	1885-86.	1884-85.
	Tons.	Tons.	Tons.	Tons.
France.....	550,000 ..	500,000 ..	298,407 ..	308,410
German Empire ..	1,000,000 ..	1,012,500 ..	838,131 ..	1,154,817
Austro-Hungary..	450,000 ..	525,000 ..	377,032 ..	527,766
Russia and Poland.	440,000 ..	475,000 ..	537,860 ..	386,433
Belgium	110,000 ..	91,120 ..	48,421 ..	88,463
Holland and other Countries	50,000 ..	50,000 ..	37,500 ..	50,000
Total.....	<u>2,600,000</u>	<u>2,653,000</u>	<u>2,137,351</u>	<u>2,545,889</u>

Mr. Licht makes no alteration, from last month, of his estimate of the current campaign.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The market has not undergone material change during the past month either for raw or refined. Cane kinds are steady. German beet 88%, which at one time, owing to speculative operations, reached 13s. 3d., is now 12s. 7½d., whilst for new crop, 11s. 9d. is quoted.

Refined has supported its position, although foreign goods continue in plentiful supply.

The consumption in the United Kingdom shows a satisfactory increase, and the same may be said of the United States.

Confidence in present values is becoming more general.

The imports of American refined in June amounted to 4,258 tons, and for the six months to 32,850 tons, against 28,124 tons for the six months ending June, 1886, or an increase this year of 4,726 tons.

The increase in the imports of refined, all kinds, from January to June, 1887, show an increase of 21,276 tons upon 1886.

The deliveries in the United Kingdom up to 23rd July, show an increase of 17,533 tons as compared with the same period in 1886, and the imports an increase of 3,078 tons.

The Stocks in the United Kingdom on 23rd July were 230,932 tons against 317,342 tons in 1886, a decrease of 86,410 tons.

Present quotations for the standard qualities, as under, are:—


FLOATING.			Last Month.
Porto Rico, fair to good Refining	12/- to 12/6 against	11/9 to 12/3.	
Cuba Centrifugals, 96% polarization	13/- to 13/3	„ 13/3 to 13/3.	
Cuba Muscovados, fair to good Refining..	12/- to 12/6	„ 11/9 to 12/3.	
Java, No. 14 to 15, good to strong	13/9 to 14/-	„ 13/6 to 13/9.	
LANDED.			Last Month.
Madras Cane Jaggery	8/6 to 9/- against	8/6 to 9/3.	
Manilla Cebu and Ilo Ilo	8/6 to 9/-	„ 8/6 to 9/3.	
<hr/>			
Paris Loaves, f.o.b.	15/- to 15/1½	„ 15/- to 15/6.	
Titlers	17/3	„ 17/-	
Tate's Cubes.. .. .	19/3	„ 19/3	
Austrian-German Beetroot, 88% f.o.b. ..	12/7½	„ 12/9 to 12/10½	

THE SUGAR CANE.

No. 218.

SEPTEMBER 1, 1887.

VOL. XIX.

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GERMAN SUGAR COMPANIES,

Company.	Sales, &c.	Outlay and Expenses.	Gross Profits.	Written off.	Gratification, Interest, &c.	Cost of Beets.
	Marks.	Marks.	Marks.	Marks.	Marks.	Pfennig.
Dirschau .....	.....	.....	162,382	47,643	{ 16,687 12,746 }	a 1·00
Wetterau .....	.....	.....	71,967	36,390	....	....
Eichthal	929,265	838,241	91,024	104,445	....	....
Schackensleben .....	.....	.....	52,241	49,683	....	....
Droebe! .....	.....	.....	.....	9,814	....	....
Harsum .....	.....	.....	{ 39,956 8,400 }	38,851	....	b 98½
Hessen .....	.....	.....	.....	?	....	....
Seesen .....	.....	.....	.....	23,239	....	....
Othfresen .....	.....	.....	.....	34,787	....	c 90½
Rautheim .....	.....	.....	41,196	33,500	21,770	....
Wabern	1,593,839	1,556,817	37,032	31,443	....	....
Reinstedt ..	426,569	413,920	.....	12,775	....	....
Camburg .....	.....	.....	121,956	51,956	?	1·05
Uslar	434,908	400,560	34,348	34,321	....	....
Broitzem .....	.....	.....	48,286	13,624	....	d 1·28
Liessau .....	.....	.....	13,528	(?) 9,020	....	....
Gross Zinkendorf } (Austria) .....	.....	.....	.....	.....	....	....
Ceres (Dirschau) ..	.....	.....	91,740	62,495	6,509	....
Brakel	1,469,394	1,421,229	48,165	46,672	....	....
Ringelheim .....	.....	.....	61,117	159,857	....	e 68
Dingelbe	694,559	732,851	.....	nil.	....	....
Junghunzlau } (Bohemia) .....	.....	.....	.....	.....	....	....

The refinery of Messrs. Spakler & Tetterode, Amsterdam, is only working half time in consequence of the low prices of refined sugars.

a Cost of working (in addition) 1·26 pf. per centner.

b " " " 49 pf. per centner.

c Of this M. 8,923 go to clear off last year's debit balance.

d It is doubtful whether this is *net* profit.

e Cost of working (in addition) 39½ pf. per centner.

f Increasing the debit balance to M. 130,761.

CAMPAIGN 1886-1887.—(Continued from page 395.)

Company.	Net Profit.	Loss.	Carried forward or put to Reserve.	Dividend.	Capital.	
					Shares, &c.	Loan.
	Marks.	Marks.	Marks.		Marks.	Marks.
Dirschau.....	85,304	....	R. 4,304	18%	.....	.....
Wetterau	35,577	....	R. 4,255	4%	.....	.....
Eichthal .....	.....	13,421	.....	....	.....	.....
Schackensleben....	2,353	....	R. 205	....	.....	.....
Droebe! .....	.....	27,290	.....	....	.....	.....
Harsum	c 9,505	....	F. 581	....	.....	.....
Hessen	d 90,795	....	.....	....	.....	.....
Seesen	024	....	.....	....	.....	.....
Othfresen	3,626	....	R. 3,626	....	.....	.....
Rautheim .....	.....	f 14,075	.....	....	.....	.....
Wabern	5,921	....	.....	....	.....	.....
Reinstedt .....	.....	g 125	.....	....	.....	.....
Camburg	70,000	....	.....	10%	.....	.....
Uslar	027	....	.....	....	.....	.....
Broitzem.....	34,662	....	.....	....	.....	.....
Liessau	4,508	....	.....	i 3½%	.....	.....
Gross Zinkendorf } (Austria)..... }	.....	....	.....	j 20%	.....	.....
Ceres (Dirschau) ..	17,727	....	{ R. 17,727 } { R. 5,008 }	....	.....	.....
Brakel	1,493	....	.....	....	.....	.....
Ringelheim	260	....	F. 260	....	.....	.....
Dingelbe.....	.....	m 38,292	.....	....	.....	.....
Jungbunzlau } (Bohemia) }	.....	....	.....	5%	.....	.....

g A small credit balance from the year before is lost.

h Including cost of working.

i Part taken from reserve fund.

j Last year, 15%.

k Cost of working (in addition) 60 pf. per centner.

l Including a debit balance of M. 14,016 from 1886.

m Covered out of reserve fund.

The Munich correspondent of the *Manchester Courier* says that Messrs. Fahlberg, List, and Co., who have erected extensive works at Salbke, near Magdeburg, have despatched the first parcel of saccharine produced in their establishment, so that there is now some prospect of this article coming at last into the market. Saccharine, as is well known, is a sweet substance obtained from Toluol, perfectly harmless to the human system, possessing 300 times the sweetening properties of ordinary sugar, and leaves no unpleasant after taste. *The appearance of saccharine in large quantities on the market will create quite a revolution in this industry, and must affect some branches very considerably.* The starch and grape sugar manufacture which is springing up in the United States will probably benefit largely by it. For instance, a mixture of one to two parts of saccharine, with 2000 parts of starch sugar, will form an excellent substitute for beetroot or cane sugar when quantity and sweetness have to be taken into consideration. This mixture will be very valuable for making sweetmeats, liqueurs, &c., and the pure saccharine can be used in the manufacture of lemonade, champagne, &c.; it can also be employed with advantage for medicinal purposes.

We have become so accustomed to startling statements in relation to sugar, as not to be disturbed by them. About five years ago, great things were predicted of Sorghum sugar. In a very few years, the United States would be able to supply her own wants, and have a surplus for export! We hear scarcely anything of it now.

One feels curious to know what price this "first parcel of saccharine" would fetch, and for what purpose it was bought. It was stated that the cost would be about 1s. 3d. *per ounce*. It has, we do not question, some valuable qualities, which, however, will be appreciated more by our chemists and druggists than by our grocers.

We have been frequently asked for information respecting the New York "Electric Sugar Refining Company," capital \$1,000,000, in 10,000 shares of \$100 each. It is just two years since we published the prospectus of this company, and at that time operations were to be commenced forthwith. Our latest information is of a like nature. Holders of shares in this country, we are told, are very sanguine, and those who might be induced to sell will only do so at a high premium. One is naturally curious to know what has been done during the past two years, for if it is the good thing that it is represented to be, much valuable time, it appears to us, is being lost. In November, 1885, Mr. Friend, the inventor, was over in this country, and had an interview with some of the Liverpool refiners, which, to put it mildly, was not of a very satisfactory character.

THE SUGAR CONGRESS.

The proposal of the English Government is naturally exciting considerable discussion in interested circles, especially in France and Germany.

The situation is fairly described by the *Sucrierie Belge*, which in common with the French *Journal des Fabricants* is a little sarcastic on what they consider "a complete right-about-face on the question on the part of the English Government." The former paper says: "We have not forgotten the very ironical sarcasms of the English ministers on those nations who were sacrificing a portion of the duty levied on sugar in order that the English people might consume this article at a ridiculously low price." In the same connection the *Journal des Fabricants* quotes a speech of M. Léon Say, delivered over three years ago, in which he stated that Lord Granville told him: "Germany and Austria are delivering us cheap sugar; it suits these countries to do this, and you ask me to request them to desist; do you want us henceforth to pay a higher price for our sugar? As long as it suits these countries to supply us with sugar at a low rate, we shall take very good care not to complain." They consider that if England really has decided to adopt reprisals in the case of those countries which may decline to enter into a convention, she is breaking through her traditional economic policy, "which puts above all other interests those of the British consumer," and they loudly assert that all that Germany wants is to put a stop to the progress which France is so rapidly making by means of the very system which has brought about the German supremacy, which the latter now fears to lose. The *Sucrierie Belge* likens the conduct of Germany to that of the traditional fox, who wished all his companions to undergo the same amputation as himself, and states that the abolition of premiums all over Europe would give the German industry a superiority greater than it now possesses.

The following is worth reproducing *in extenso*:—

"Another consequence of incalculable extent would also result as regards the competition of colonial sugars. Everyone now admits that the fall in the price of sugar is caused by the premiums; the suppression of these would consequently result in raising quotations to an extent difficult to estimate precisely, which would, however, be below the present average premium. From this it follows that the position of the manufacturers of beetroot sugar would be unfavourably affected,

while that of the cane sugar manufacturers would be materially improved. This first result would probably be followed by another, viz.: an increase in the production of cane sugar, bringing with it an inevitable diminution in the cultivation of beets. Germany would do well to reflect on this."

Adverting to these remarks, the *Deutsche Zucker Industrie* has the following, which cannot fail to interest our readers:—

"What occasions us anxiety, is the competition of cane sugar, already alluded to by the *Sucrerie Belge*. Not that we regard the conflict between beetroot and cane sugar as one that must lead to the complete extinction of one or the other. In this connection it is only necessary to look at the quantity of sugar annually coming into open market, which amounts in round numbers to 5,000,000 tons, of which each competitor supplies half. Undoubtedly the cane is richer in sugar than the beet, and the process of manufacture, especially the mode of extracting the juice, has a much more extensive path of progress before it in cane-producing countries than with us. But these more favourable conditions have always been present, and, in spite of this fact, the production of beetroot sugar has increased more rapidly than that of cane sugar. Again, the obtaining of labour presents great difficulties in the greater part of the colonies.

What appears to us most essential for the maintenance of the struggle against the cane sugar, is that endeavours should be directed towards the cheapest possible production of sugar, and not, as is at present the case, towards obtaining the greatest possible gain out of the duty.

Mr. Herbertz, the able editor of this journal, has been endeavouring to contribute to the solution of the question how the abolition of premiums can best be brought about, and has published an estimate, showing that according to the data before him (the accuracy of which does not appear to be contested) the five largest sugar-growing countries of Europe, viz., Germany, Austria, France, Belgium, and Holland, could, without suffering any loss to the Treasury, at once reduce very considerably the rate of taxation on sugar, and so effect an eventual unification of the rate of duties, without which it would be difficult to establish a practical and durable international convention. This term of the problem being solved, the likelihood of which the *Journal des Fabricants* does not admit, and there being an equality of treatment in the various countries interested, the latter journal asks what means could be found to extinguish the

artificial advantages, that is, the *excédents* (or excess beyond the established legal yield of sugar from a given quantity of beets) and the premiums. Mr. Herbertz replies, that those who do not want to attain a given end will not regard any proposal whatever as likely to bring about that end, and so he has no proposal to make, because the *Journal des Fabricants* desires the maintenance of the premiums; but every government will have to speak for itself as to the way in which it proposes to attain the end desired, which end the French Government also will desire, if, as is asserted in many quarters, it has decided to send a representative to the Congress. As far as Germany is concerned, he says she could establish the fact that she *could do away with all premiums, commencing with the next campaign*, abolishing the tax on beets and abiding by the simple tax on consumption of 6s. per cwt. on sugar of all kinds, which has just been legally enacted. Any assertion coming from Mr. Herbertz is entitled to the highest respect, but we cannot help thinking that whatever the German Chancellor might have to say, as a matter of purely fiscal policy, the German sugar manufacturers will have something else to say before they will be found agreeing to the total abolition of premiums on export. Mr. Herbertz's opinions as to the ultimate disastrous effects of premiums are well known, but we have yet to learn that the German sugar manufacturers by any means fully adopt his views.

The probability of the French manufacturers agreeing to any convention having for its object the abolition of premiums, is apparently, at present, rather remote, as may be seen from the protest addressed by their *Chambre Syndicale* to the President of the Council, a translation of which will be found on page 461.

Mr. Dureau, of the *Journal des Fabricants*, says: "The English refiners are complaining loudly, and their cry of distress has been so loud that Lord Salisbury could not afford to turn a deaf ear to it; and, he adds, the reason is very simple. In 1883, at the time when Mr. Léon Say was speaking, the British refiners were singularly prosperous, and the competition of French refined sugars, the outlets for which were everywhere closed, no longer troubled them. The Austrian and German premiums at that moment scarcely affected anything but raw sugar, which the refiners could procure very cheaply, and their position was excellent. It is quite another thing now, with imports of refined sugars into the United Kingdom from all sources reaching 180,247 tons in the first six months of 1887, being 88 per

cent. of the total imports of sugar. In such a state of things, we can well understand the English refiners, threatened with extinction, calling out loudly for a conference, in which the English sugar-producing colonies are equally interested."

Mr. Dureau asks how France can possibly reduce her tax, or, in presence of great financial necessities, give up any part whatever of the splendid revenue from this source, which serves to feed the sugar industry with premiums of which it stands in need. She will need this revenue so long as she is not in a position to contend with equal arms against rival sugar-producing nations, so long, in fact, as she has not materially reduced the considerable lead which Germany has gained over her, and for that a certain number of years are required. The article closes: "Finally, when we come to consider the convention from a philosophical point of view, we have to ask, what will be its practical utility? For, if we look at what is demanded of the French sugar manufacturers, which is evidently that they should give up their premiums and the development of their trade, and become less troublesome or less formidable to their rivals,—we do not see what is offered them in exchange, and consequently what reason they would have for giving up their rights and their freedom. The stronger may be free to disarm, but the weaker must hold their positions; those acquired in 1884 are excellent, let us know how to keep them."

The *Deutsche Zucker Industrie*, commenting on what it calls the memorable declaration of the *Chambre Syndicale*, says:—

"We must confess that a more unfavourable opinion of the present position and future prospects of the French beetroot sugar industry could not be pronounced, than is here given forth by its own chosen representatives. Without premiums and protective duties the French sugar industry cannot exist! Now, if both these conditions are essential, then the right to exist is wanting. We can understand an industry asking protection against the production of other countries. This may be granted in the prospect that by means of it the industry will grow stronger, and eventually continue without the help of protection, or, in a case where the conditions of production in other countries had undergone some extraordinary change, and an industry affording existence to several thousands was threatened with destruction. But no industry whatever has a right to ask to be allowed, with the aid of the Treasury and at the expense of all the taxpayers, to sell its products, outside its own country, below the cost of production and injure the industries of other countries.

“As is well known, the sugar premiums were not originally intended to be granted by the Acts regulating the duties ; they arose from the fact of the manufacturers being clever enough to take advantage of defects in the enactments, and now that they have been continually growing in magnitude, and becoming more general, no country is any longer in a position to proceed, independently, to abolish the premiums which it is granting without risking the existence of its industry. Hence arises the necessity of a congress, in order, by concerted action, to put an end to all premiums, even though this should not be done at one stroke. If the French sugar industry feels too weak to contend against other countries it may secure the supplying of home requirements by protective duties. But if it wants to assume an aggressive attitude, and maintain premiums after they are abolished in other countries, in order, notwithstanding its weakness, to gain an artificial advantage in the world's market, then the other countries will have to protect themselves by countervailing duties (*Gegenzölle*).

In a later article on the subject the *Journal des Fabricants* makes the definite statement:—“The truth, according to our ideas, is, that practically the abolition of premiums, their absolute abolition, is not susceptible of realisation. First of all, the establishment of an uniform rate of duty or the suppression of the duty in all countries cannot be dreamed of, and here we have one of the most serious obstacles to an international understanding loyally established and applied ; in the next place, the general and complete abolition of secret disguised premiums resulting from excess of yield over the legal rate, from differences in allowances, in weighing, and in sampling, &c., is materially impossible.” Further on the statement is made that there exists no exact process for determining the yield in refining.

The *Sucrerie Indigène*, at the close of an article on the subject, remarks:—“There is a good deal of talk about the countervailing duties (*droits compensateurs*) which England is said to be willing to establish on bounty-fed sugars entering that country. Admitting that this were so, although the economic policy of England is opposed to it, would not the bounty-fed sugars be able to evade those countervailing duties by passing through countries which had agreed to the convention ?”

As the question of the congress will be discussed, on the 15th September, by a general meeting of the French manufacturers, it is probable that matters will remain, so far as France is concerned, *in statu quo* until that time.

THE INTERNATIONAL CONFERENCE ON SUGAR
BOUNTIES.

The following letter has been addressed by the British Sugar Refiners' Committee to Lord Salisbury :—

THE MOST HONOURABLE THE MARQUIS OF SALISBURY, K.G.

My Lord,

I am desired by the Sugar Refiners' Committee to forward to you the enclosed extract from the *Procès-verbal** of the meeting of the *Chambre Syndicale des Fabricants de Sucre de France*, specially held to consider the question of the proposed International Conference for the abolition of the sugar bounties. The resolution adopted at that meeting protests in the strongest terms against the proposed Conference, on the grounds that a Convention would not prevent foreign Governments from giving hidden bounties to their industry; that the conditions of production are not the same in all countries; that, for instance, the French industry is utterly unable to compete with the culture and manufacture of sugar in Germany, which, owing to its legislation, has attained to a degree of perfection unknown in France; that even under natural conditions Germany can produce more economically than France, and that it is also impossible to compete with cane sugar on equal terms. For these reasons the Chamber declares that it is impossible for the French sugar industry to live without bounties; protests in the strongest terms against the proposed Convention, and desires the French Government to refuse the invitation to the Conference, because the suppression of bounties would inevitably involve the destruction of the French sugar industry.

This declaration appears to be of the highest interest at the present moment. It must be borne in mind that, until the change of legislation in 1884, the producers of beetroot sugar in France worked in bond, received no return of duty on export, and, therefore, enjoyed no bounty. Up to that time they were, therefore, the strongest advocates for an International Convention, and frequently pointed out that the working of the French beetroot factories in bond was a conclusive proof that such a system was practicable, easy in operation, no hindrance or injury to the manufacturers, a perfect security for the revenue, and a sure safeguard against any possibility of bounty.

It must also be recollected that Germany and Austria are now legislating, or about to legislate, in the direction of manufacturing in

bond and charging the duty only on the sugar as it goes into consumption, a system which would at once stop their present bounties. They might, no doubt, substitute for the existing bounties a direct and open payment of a premium on exportation, as has been proposed in Austria, but this will not happen if they agree to a conference.

If, however, as is possible, the French Government accede to this urgent protest of their sugar industry, and decline to join the conference, the question will immediately arise whether Great Britain will consent to countervail the French bounty, and if that consent be not given the proposed Conference will at once fall to the ground.

The time has therefore arrived when this question of the countervailing duty can no longer be neglected, but must be faced and dealt with on its merits, all misconceptions as to its operation having first been finally disposed of.

Great efforts have been made to misrepresent a duty to countervail a bounty as a "protectionist" and retaliatory measure, inconsistent with our commercial policy and contrary to the interests of the consumer. These representations were, however, entirely disproved in the evidence taken before the Select Committee of the House of Commons on Sugar Industries. It was shown there, as it has also been shown elsewhere with sufficient frequency, that a duty to countervail a bounty is consistent with free trade principles and absolutely necessary in order to maintain them, that it is therefore in no way "protection," as commonly so called in this connection, nor retaliation, and that it is for, not against, the interest of the consumer.

The operation of a foreign bounty is to protect the foreigner on British markets. This, under our free trade system, ought to be most strenuously resisted. The countervailing duty would simply remove the bounty and leave the foreign producer on equal terms with his competitors; it would, therefore, simply restore free trade. All other sugar would come in freely, and, therefore, the natural price of sugar would be in no way disturbed. A duty to countervail a bounty is, therefore, quite consistent with and, in fact, necessary to the maintenance of our commercial policy, which is based on the principle that all producers should be placed on a footing of equality on our markets.

Another operation of the bounty is that natural sources of production are restricted, to the detriment of the consumer. The removal of the bounty relieves the consumer of this hindrance to the progress of natural production, and, therefore, benefits instead of injuring him.

It is further manifest that a duty levied on one particular sugar for

the purpose of removing the bounty which it receives, while sugar from all the rest of the world comes in free, is a duty which must necessarily be paid by the producer, not by the consumer. For instance, the total annual importation of sugar into this country amounts to 1,100,000 tons, while the imports from France amount only to 52,000 tons. It is clear that if France alone refuses to abolish bounties, a duty levied to countervail the bounty on French sugar would have to be paid by the French producer out of his bounty, if he desired, as he certainly would, to continue to send sugar to our markets. The only effect that such a duty would have on the price of sugar would, therefore, be that arising from the loss of bounty to the French producer, and the consequent tendency which that loss would have, to restrain the artificial over-production caused by the bounty. But, at the same time, natural sources of production would be relieved from the restraint put upon them by the bounty-fed competition, and would therefore expand to their natural limits *pari passu* with the check put on the unnatural expansion of the bounty-aided production. Though the consumer would lose the artificial and therefore precarious increase of production on the one side, he would have restored to him the natural increase on the other.

The question of the most favoured nation clause in our commercial treaties has been raised as a difficulty in the way of countervailing a bounty; but it is clear that the intention of that clause has been entirely frustrated by the operation of the bounty, which destroys the equality aimed at by the stipulation. As the countervailing duty restores the equality, it in reality restores the operation of the clause which the bounty had rendered nugatory. If, however, there be any technical difficulty on this point, it can be got over in the way suggested in the Report of the Select Committee on Sugar Industries.

For these and many other reasons which might be adduced, we beg most respectfully to urge that the principle of a duty to countervail a bounty should be admitted by Her Majesty's Government as necessary for the maintenance of Free Trade, strictly consistent with the established commercial policy of this country, and with our commercial treaties, and the only way in which the permanent interests of the consumer can be secured.

I am, my Lord,

Your obedient servant,

GEORGE MARTINEAU.

21, Mincing Lane, 18th August, 1887.

* TRANSLATION OF THE EXTRACT IN QUESTION.

The Chamber Syndicale of the French sugar manufacturers met on the 11th inst., and considered the project of a Conference on the sugar question, to arrange a convention for the suppression of premiums, in which the French Government is invited to take part. The following is an extract from the minutes :—

“The Chambre being of opinion that this convention (which should include an agreement on the part of all the sugar producing countries of the world, and not of European countries only), would not prevent foreign Governments from favouring their own industry by clandestine advantages; that there would be no formal means of enforcing its loyal execution by all the contracting parties; considering, further, that the economic conditions of production are not the same in all countries; that the French sugar industry especially, is, in the present state of affairs, absolutely unable to contend against the German industry, and above all, the German agriculturalist; that it has been passing through a course of transformation for only three years, whilst its rival, thanks to the legislation which it has possessed for 40 years, has reached a degree of progress and perfection unknown to our cultivators; considering again that, thanks to lower taxation, to a greater cheapness of labour and of all the articles of consumption, coal, &c., Germany can produce sugar under economical conditions impossible to realise in France; considering also that competition is no longer possible with cane producing countries, certain of which are at this moment selling sugar in London at 22 francs per sack, *i.e.*, at a lower price than the cost of beets; convinced that it is absolutely impossible for the French sugar manufacturers to exist if the premiums on manufacture and the surtax on entry are taken away from them, *protests unanimously and with its utmost energy* against the project of an International Convention.

“It expresses the fervent hope that the French Government will refuse its assent to the conference, and empowers the former *Commission des Douze*, the powers of which it renews, to convey to the President of the Council its energetic protest against the projected convention; to demonstrate to him that the suppression of premiums will inevitably and irrevocably bring with it the extinction of the French sugar cultivation and industry, and to beg him most urgently to oppose the assent of the Government to a Conference so prejudicial to French interests.”

Foreign Office, August 22, 1887.

Sir,—I am directed by the Marquis of Salisbury to acknowledge the receipt of your letter of the 18th inst., with its inclosure containing observations on the subject of the proposed Conference on the sugar question, and on the question of imposing countervailing duty on foreign bounty fed sugar; and I am to request that you will inform the Sugar Refiners' Committee that their representations will be considered when the proper time arrives, or in the contingencies adverted to by them.

I am, Sir,

Your most obedient humble servant,

JAMES FERGUSSON.

G. Martineau, Esq.,

21, Mincing Lane, E.C.

THE POU-À-POCHE BLANCHE IN RÉUNION.

[We insert the following translation, as the knowledge of any facts bearing on the live history of our pests must necessarily help towards their extermination.—ED.]

Translated from Dr. Berg's *DES INSECTES HERBIVORES DE LA RÉUNION* (Bull. Soc. Imp. Zool. d'Acclimatation, 9th November, 1862, Paris).

Page 942, *Pou-à-Poche Blanche* (local name).—"This insect belongs to the order Hemiptera, family Homoptera. The male and female are dissimilar, the former alone having wings. In the female the body is flat underneath and spherical above, with a very thin reticulated skin, and in the perfect insect with transversal rings. The antennae are very small and curved; eyes round looking like black points under the microscope, at the base of the antennae, and placed outwards. The body is covered with a white powder, and beset with hairs or light filaments, which, as the insect grows old, harden so as to form a shell for it. The rings of the body are downy ("tamenteux"), and covered with a white powder. Every ring is skirted by a row of filaments, a sort of down. They have three pairs of claws, very small, with three articulations. The eggs are round, very adhesive, yellowish, and very numerous—at least 400 to 500. Their laying takes place rapidly after a long gestation. As the eggs emerge they become

affixed under the belly of the female, crowded like a string of beads, and surrounded by a sheath which is nothing else than the abdomen of the female which has gradually swelled. The larvae emerge from this shell by a posterior opening. They are soft, flat, very thin; pale at first and then reddish. The females hasten to find a suitable place on the leaves or stems, and remain there. They die on the spot where they have settled.

“The male is much smaller than the female; he looks like a pou when young, but lengthens later on. His wings, spotted black and white, are crossed. His antennae are filiform, his proboscis (“bec”) is hidden under the thorax, and the rings of the abdomen are sufficiently well marked. He is a very lively insect, and difficult to catch; he hovers round the females. They call him, locally, the butterfly of the pou. When hatched, the males, cohere in large numbers. They look, first of all, just like grey spots, then, as they develope, like black and white spots, the black colour being in the middle of the white. At the end of a few days they begin to move. These movements are at first imperceptible, but twenty-four hours afterwards they can fly away. They do not live as long as the females; they fulfil their mission and die.

“Let us return to the female.

“Attached to the epidermis of the leaves, with her proboscis implanted in the parenchyma she brings up her little ones by a sort of prolonged gestation. Her voluminous abdomen is only a protecting envelope of a progeniture which devours her sides. She exhausts herself and dries up, and when the laying has taken place as she gets emptied she curls up on herself, her posterior extremity advancing towards the anterior extremity. But while the inoffensive male has probably only been able to suck the nectar of flowers, the female, in dying, has left baneful traces of her passage. She has caused spots, consumption, and exhaustion. The young cane attacked by these hungry parasites, whose multiplication is immense, and previously struck by the cryptogamic attacks, dies of asphyxia, that is to say, by being deprived of the products of the leaf respiration.”

[Note:—The learned author says on page 941 that the Pou-à-Poche Blanche and the Borer are not the real destroyers of cane. He maintains that cryptogamic vegetable parasites are the first to do the damage, and that their ravages are followed by the animal parasites. He ascribes the presence of the vegetable parasites to weakness in the cane-plant

due to excess of nitrogenous manures, and to continuous growth on the same soil without fallow or crop rotation. He says nothing about the presence of ants, and his remarks on the borer contain nothing not already known.—H. L. R.]

MISS ORMEROD ON *ICERYA PURCHASI*.*

Our readers must, before now, have become familiar with the name of that lady who is devoting her time and income to the discovery of effective means for the annihilation of farmers' insect enemies. For the past ten years Miss Ormerod has published an Annual Report summarising her practical studies on the agricultural pests of Great Britain and Ireland. These reports in connection with the fact that her methods of investigation are strictly scientific have led agriculturists outside the United Kingdom to apply to her for information and help, and planters may remember a paper Miss Ormerod prepared on the Cane Borer some years ago. If the pamphlet now before us does not deal with a sugar cane parasite, it deals with a scourge so closely connected with one that has long troubled planters that we have no hesitation in calling the attention of all those interested to take notice of it. Miss Ormerod, first of all, establishes the fact that the *Icerya Purchasi* is quite a distinct species from *Icerya Sacc.*, and this is at once obvious to any observer who has seen specimens of the two species side by side. The author's investigations show, nevertheless, that the two species are almost identical in habits—in so far as our limited personal knowledge goes, we can now see no appreciable difference—and the knowledge of this fact will naturally commend the study of the remedies to planters. With regard to the artificial remedies proposed we are a little inclined to doubt, on account of the very large areas planters have to deal with, whether it is possible to carry out some of these practically. As a consequence, we conclude that the cultivation of the natural remedies, that is the protection and the propagation of the insects who destroy the *Iceryas*, of more practical effectiveness as a remedy to be made use of by the planters. In this respect Miss Ormerod gives some most valuable information. Like all her papers this one is well illustrated.

* Notes on the Australian Bug (*Icerya Purchasi*) in South Africa, by E. A. Ormerod. pp. viii. 36, 8vo. Simpkin, Marshall & Co., London, 1887.

SECOND ANNUAL REPORT OF THE AGRICULTURAL STATION ESTABLISHED IN BARBADOS IN 1885.

Laid before the House of Assembly by Command, 19th July, 1887.
(Ordered by the House of Assembly to be printed, 19th July, 1887.)

Government Laboratory, June 1st, 1887.

Sir,—We* have the honour to forward to you, for the information of His Excellency the Governor, the following account of the results obtained upon the experimental fields at Dodds Reformatory :—

The experiments during the growth of the crop which has just been reaped, were carried on in two directions :—1st, to ascertain the effects of the various manurial constituents of plant food, when applied to the ordinary or bourbon variety of sugar cane, upon the soil and under the climatic conditions existing during the year at Dodds ; 2nd, to ascertain the value of the new varieties of sugar cane selected by and forwarded under the directions of Mr. Morris, from Jamaica, and to compare them with the varieties at present cultivated or existing in Barbados. We have also continued the investigation into the composition of the rainfall which we commenced in June, 1885. It will be most convenient to consider the results obtained in the following order :—1st, the amount and composition of the rainfall ; 2nd, the experiments with manures ; 3rd, the experiments with the new varieties of the sugar cane.

PART I.

The amount and composition of the rainfall.

The rain was collected by means of a 10 inches glass funnel and analysed. Forty-five samples were examined, representing the entire rainfall from the time of planting until the reaping of the canes. (December, 1885,—April, 1887, inclusive). The rainfall amounted to 85·58 inches, and its true average contents of chlorine and nitrogen was

	Milligrams per litre at 80° Fahr.
Chlorine	9·163
Nitrogen as ammonia salts	·070
Nitrogen as Nitrates	·249

The highest single rainfall occurred on August 16th, 1886, and amounted to 9·14 inches, the lowest in April, 1886, and amounted to ·05 inch, their compositions were in milligrams per litre.

* Signed by J. B. Harrison, M.A., and John R. Bovell.

	August 16th.	April.
Chlorine	4·252	28·296
Nitrogen as ammonia salts.....	·057	·214
Nitrogen as Nitrates	·329	·922

As one inch of rain per acre at 80° Fahr. weighs 225,680lbs. we received per acre during the experiments the following weights of water, chlorine, and of nitrogen.

Water	19,313,694lbs.
Chlorine	176·97lbs.
Nitrogen as ammonia	1·35lbs.
Nitrogen as nitrates	4·81lbs.

As the chlorine in the rain is derived from the sea spray, knowing the composition of the water of the Atlantic we can estimate the amounts per acre of sodium chloride and of potash added to the soil during the experiments by the rain. These were 249lbs of sodium chloride, and 6·19lbs. of potassium chloride, equal to 3·91lbs of potash.

The amount and composition of the monthly rainfall is shown in the following table, together with the highest and lowest amounts of each constituent found in the forty-five samples examined.

Amount and Composition of the Monthly Rainfall, December, 1885, to April, 1887.

Month.	Inches of Rain.	Milligrams per litre 80° Fahr.		
		Chlorine.	Nitrogen as Ammonia.	Nitrogen as Nitrate.
December, 1885	3·45	13·809	·080	·121
January, 1886	·41	21·103	·123	none
February, „	·98	33·967	·272	·142
March, „	1·40	20·522	·351	·286
April, „	1·51	15·520	·203	·616
May, „	2·11	12·470	·082	·555
June, „	2·34	12·657	·105	·355
July, „	9·53	7·270	·093	·182
August, „	19·02	5·804	·058	·235
September, „	11·61	6·592	·053	·186
October, „	8·63	5·683	·047	·167
November, „	15·00	4·939	·041	·236
December, „	1·96	17·972	·041	1·077
January, 1887	3·12	21·399	·048	·187
February, „	2·73	35·852	·107	·249
March, „	1·46	24·085	·092	·306
April, „	·32	28·649	·210	·757
Highest.. .. .	.....	47·042	·914	1·548
Lowest .. .. .	.....	2·476	·016	none

PART II.

EXPERIMENTS WITH CHEMICAL MANURES.

Nature, composition, and previous history of the soil of the Experimental Fields.

The field used for these experiments was, like that used for those of 1884-1885, one of the least fertile at Dodds. In its general character, it resembles that field, but was lighter, being a little more sandy. Its general nature and composition is shown by the following analysis made at the time when the manures were applied:—

Mechanical Analysis.

Stones removed before analysis 91%

Airdried Soil.

Coarse gravel	565
Fine gravel	091
Coarse sand	17.594
Fine sand	4.190
Clay and fine soil.....	65.090
Moisture.....	12.463

100.000

*Chemical Analysis.**Airdried Soil, Stones removed.*

Moisture	12.463
Combined water	9.869
a. organic matter	1.874
Soluble silica	482
Phosphoric anhydride	097
Sulphuric anhydride.....	005
Carbonic anhydride	099
Nitric anhydride	trace
Chlorine	028
Alumina	4.713
Ferrous oxide.....	403
Ferric oxide	3.366
Manganese sesquioxide.....	495
Calcium oxide (lime).....	1.981
Magnesia.....	784
Potash	095
Soda	598
Crystallised silica (quartz sand)	16.448
Combined silica	28.499
Alumina	13.969
Ferric oxide.....	3.486
Potash	046
Soda	278

100.078

Clay and sand
62.726 %

a. Contains nitrogen.....	·164
<i>Distribution of the organic matter and combined water.</i>	
Organic matter in coarse gravel.....	·012
„ fine gravel	·005
„ coarse sand.....	·243
„ fine sand	·750
„ clay and fine soil	·864
Combined water in clay and fine soil.....	9·869

11·743

The field was one of those known as a “rested field,” that is it had been cropped with canes in 1883-1884, and during 1884 and 1885 with imphee (*sorghum saccharatum*, var.) and sweet potatoes, and was replanted with canes in December, 1885, having then been fallowed from the cane for twenty-one months. As our object is not to ascertain the manurial requirements of the sugar cane under abnormal conditions of cultivation, but under those found suitable for the successful growth of the cane in this island, there was applied to the field, some weeks before planting the canes, about twelve tons per acre of compost, containing about 14% of phosphoric anhydride, ·22% of nitrogen, and ·11% of potash, and a considerable proportion (12-14%) of organic matter. The object of this was to bring the soil into a more favourable mechanical condition, especially with regard to its power of retaining moisture.

The experiments were arranged in three groups, the first to examine the effects of the addition of nitrogen in different proportions and in the forms of sulphate of ammonia and nitrate of soda; and which latter part of the experiment ran through all three groups as in each trial, duplicate plots were manured with equivalent amounts of these substances; the second with soluble phosphates in different proportions, and the third with potash in the same way. The manures, the constituents of which were supplied by Mr. H. E. Thorne, of the Antilles Manure Works, were mixed and applied under our personal supervision on June 29th, when in order to lessen the danger of loss of nitrogen by drainage, only half the amounts of the nitrogenous constituents used were applied, the remainder being added as top dressings on August 14th. In arranging these experiments we bore in mind that the specific action of a manurial substance can only be developed for its study upon either soil or plant when the other

necessary ingredients of plant food are present in relative excess; so in the case of each plot in the nitrogen group, in addition to the sulphate of ammonia or nitrate of soda applied, dressings of superphosphate of lime and of sulphate of potash, in the proportions which former experiments had indicated as supplying in relative excess phosphates and potash were applied; whilst in similar manner each plot in the phosphate group received nitrogen and potash, and in the potash group nitrogen and phosphates. In addition to the foregoing, we laid down a plot without manure, and one with a very heavy dressing of stable manure; whilst we also examined into the yield, and the nature of the canes grown upon the remaining portions of the field which were manured with a combination of commercial artificial manures, such as from the results of previous experiments had been adopted as probably best suited for the whole plantation. As from the lay of the field the soil varied somewhat in fertility, that occupied by the nitrogen group and the portions manured with the combination of the artificial manures being the least fertile, we must here point out that, whilst the results obtained on the different plots of each group are fairly comparable one with another, the results obtained on plots in different groups cannot be fairly compared. The unmanured plot represented fairly the average of the field, being about equally fertile with the potash group, somewhat less so than the phosphate, and more so than the nitrogen one and the outlying portions of the field. Every care was taken to render the factors of light, exposure to wind and rain, etc., as far as laid in our power, identical on the plots of each group.

The crops upon the plots were reaped on April 11th, 12th, and 13th, the canes being then somewhat over ripe, the reaping having been delayed for nearly a month by unavoidable causes. The canes were weighed, ground, and the juice measured at the works of *Bushy Park*, the property of Messrs. Thomas Daniel & Co., Limited, which, through the kindness of the owners, of Mr. George A. Scaly, the attorney, and of Mr. W. C. Hutson, the manager, was placed at our disposal for the completion of our experiments. To the latter of these gentlemen our thanks are especially due for the great interest which he took in assisting us in every way, and in facilitating the attainment of our objects. By means of the specific gravity of the juice at the temperature of measurement, its weight was calculated, and the contents of crystallisable sugar per imperial gallon ascertain-

ed immediately after expression by the aid of a Soleil Scheibler polariscope kindly lent to us by Messrs. DaCosta & Co. Average samples of the juice and of the megass were taken and submitted to analysis, the necessary precautions to avoid change between the date of collection and of analysis being taken and, as in 1886, proving successful in every case.

In order to facilitate the practical planter in understanding the results of manurial experiments where it is impossible to manufacture the canes from each plot separately into sugar, it is necessary to adopt some pecuniary standard for the analytical results obtained. In order to do this we have calculated the sugars found in the juice into "available sugar" per acre for the vacuum pan process. This has been done by the figures found by Professor Wiley in his experiments on the diffusion process in 1886, and which are confirmed by the results of many analyses of the residual molasses from the vacuum pan process, and by the results of the experiments carried on at *Bulkeley* and *Carringtons* in 1885. "Available sugar" per acre is therefore the number of pounds of crystallisable sugar per acre indicated by the poplarisation of the juice, less one and a half times the pounds of glucose found by chemical analysis. After consulting some of the leading planters we considered that a rate of \$1.25 per 100lbs. would approximately represent the value, at present prices, of the available sugar in the juice, regarded as the raw material for this process. Using these figures we give the estimated profit or loss per acre in each case apparently produced by the manuring as compared with—first, the yield of the unmanured plot; second, the yield of the plots unmanured with the constituent under experiment. In experiments with the sugar cane if we consider only the weight of produce or of canes per acre as the measure of the action of the manure, a source of error is always present; the number of canes in the clumps or plants varies greatly, being affected, apparently chiefly by the nature of the cane top used for planting, by the depth at which it is planted, by the nature and previous treatment of the soil, and by the climatic conditions existing during the earlier stages of its growth, whilst the composition of the manures applied at a later period appears to exercise much less influence. In order to, to some extent, eliminate this source of error, we have ascertained, in addition to the weights of produce and of canes, the number per acre of the canes produced upon each plot and calculated from these figures the average

weight of a single cane and cane top. The figures thus obtained promise to be of great importance in assisting to ascertain the action of the manurial constituents experimented upon.

Group I.

Experiments with Nitrogen.

This group consisted of eight plots, each manured with superphosphate and potash salts, supplying 100lbs. of "assimilable phosphates" (94lbs. of "soluble phosphates" and 6lbs. of "reverted") and 30lbs. of potash per acre. Plot A.1 received only this manuring, plots A.2, A.3, and A.4 received 50, 75, and 100lbs. per acre of nitrogen respectively in the form of sulphate of ammonia, plots B.2, B.3, and B.4 similar amounts of nitrogen in the form of nitrate of soda, whilst B.1 received 50lbs. of nitrogen per acre partially in an amount of nitrate of potash containing potash equal to that in the sulphate of potash applied to the other plots, and the remainder as nitrate of soda. The experiments as to the relative manurial values of sulphate of ammonia and of nitrate of soda also extended over the phosphate and potash groups, the results obtained upon which fully confirmed and accentuated those obtained in this group. It will be most convenient also to place with this group, the results on plot D, without manure, on plot E, manured with 20 tons per acre of stable manure estimated to supply 320lbs. of nitrogen, 230lbs. of phosphates, and 265lbs. of potash per acre, and of F, the outlying portions of the field manured with 2 cwt. per acre of "Ohlendorff's Early Cane Manure" applied in January, 1886, and with 2 cwt. 2 qrs. of "Ohlendorff's Dissolved Peruvian Guano" applied in the middle of July, 1886. This method of manuring supplied 9lbs. of nitrogen, 35 to 36lbs. of soluble phosphates, and 15 to 16lbs. of potash in the first manuring, and 21lbs. of nitrogen, 54 to 55lbs. of soluble phosphates and of 7lbs. of potash in the latter one. The plots in this group and throughout the manurial experiments, with the exception of F, consisted of one twentieth of an acre each, and contained sixty cane plants, planted 6 feet by 6.

The following tables give the results of the manurings in this group and the estimated profit or loss per acre as compared with these obtained on plots D and A 1:—

TABLE A.—Results of the Reaping of the Canes.—Group I.

Number of Plot.	Cost per acre of Manure.	Number of Canes per acre.	Number of Canes in one Clump.	Weight of Produce per acre.		Weight of Canes tops per acre.		Weight of Canes per acre.		Average weight of one cane top in lbs.	Average weight of one cane in lbs.	Average weight of a clump of stripped canes in lbs.	Gain in cwt. of produce per acre upon no manure.	Gain in cwt. of produce grown upon A 1 by addition of nitrogen.
				Tons.	Cwt.	Tons.	Cwt.	Tons.	Cwt.					
A 1	\$ 5.47	13,000	10.8	28	0	4	11	23	9	.78	4.04	42.1	—13½	...
A 2	13.83	14,520	12.1	34	4½	5	8½	28	16	.84	4.44	53.7	111	124½
A 3	18.01	13,680	11.4	35	10½	4	19	30	11½	.81	5.00	57.7	137	150½
A 4	22.21	14,000	11.7	37	10½	4	15½	32	15	.76	5.24	61.1	177	190½
B 1	16.66	13,000	10.8	32	14	4	12	28	2	.79	4.84	52.4	80½	94
B 2	14.03	14,200	11.8	32	14	5	6	27	8	.83	4.32	51.2	80½	94
B 3	18.31	14,540	12.1	32	7	5	12	26	15	.86	4.12	49.9	73½	87
B 4	22.61	15,200	12.7	35	10	6	2	29	8	.89	4.34	55.0	136½	150
D	No manure.	13,760	11.4	28	13½	5	2	23	11½	.83	3.83	44.0	....	...
E	40.00	14,000	11.7	38	3	4	17	33	6	.77	5.33	62.2	189½	....
F	12.62	11,280	9.4	33	16	3	11½	30	4½	.71	6.00	56.4	102½	....

TABLE B.—Results of the Grinding of the Canes.—Group 1.

Number of Plot.	Imperial gallons of juice per acre.	Density. ° Beaume.	Percentage of juice yielded by mill.	Lbs. of sucrose per gallon of juice.	Lbs. of sucrose in juice per acre.	Percentage of glucose in juice.	"Available sugar," lbs. per acre.	Profit or loss by manuring on no manure. \$ c.	Profit or loss by addition of nitrogen to A1. \$ c.
A 1	2,945	11°	60·5	2·096	6,172	·07	6,140	— 4·08	....
A 2	3,565	11°	59·7	2·112	7,529	·02	7,517	+ 4·77	+ 8·85
A 3	3,875	11°	61·1	2·029	7,862	·09	7,812	+ 4·28	+ 8·36
A 4	4,185	11°	61·6	1·966	8,228	·65	7,789	— ·21	+ 3·87
B 1	3,565	11°	61·1	2·131	7,597	·60	7,178	— 2·30	+ 2·78
B 2	3,485	11·5°	61·4	2·164	7,541	·35	7,363	+ 2·64	+ 6·72
B 3	3,255	11°	58·6	2·206	7,180	·12	7,111	— 4·79	— 0·71
B 4	3,720	11°	60·9	2·048	7,618	·88	7,087	— 9·39	— 5·31
D	2,712	11·75°	55·8	2·243	6,083	·54	6,029	....	....
E	4,185	11°	60·5	2·042	8,546	·17	8,372	— 10·71	....
F	4,340	10·5°	69·0	1·972	8,363	·10	8,292	+ 15·67	....

TABLE C.—*Composition of the Canes.—Group I.*

Number of Plot.	Water.	Sucrose.	Glucose.	Ash.	Albuminoids.	Unknown organic matter.	Fibre.	Nitrogen in Albuminoids.
A 1	67·74	14·40	·63	·49	·27	2·80	13·67	(·044)
A 2	67·42	14·73	·69	·38	·46	2·17	14·15	(·074)
A 3	66·49	14·18	·75	·43	·41	4·77	12·97	(·066)
A 4	66·80	13·96	1·12	·43	·57	4·98	12·14	(·092)
B 1	64·62	14·79	1·01	·46	·47	5·58	13·07	(·076)
B 2	65·09	14·89	·78	·47	·31	5·08	13·38	(·05)
B 3	64·05	14·75	·88	·46	·45	5·19	14·22	(·072)
B 4	65·66	14·49	1·11	·48	·57	5·17	12·52	(·091)
D	63·99	15·06	1·00	·45	·25	4·38	14·87	(·04)
E	68·52	14·23	·94	·44	·67	3·40	11·80	(·107)
F	71·23	14·51	·49	·53	·67	2·73	9·84	(·107)

TABLE D.—*Composition of the Juice from the Mill.—Group I.*

Number of Plot.	Water.	Sucrose.	Glucose.	Ash.	Albuminoids.	Unknown organic matter.	Nitrogen in Albuminoids
A 1	79·62	19·41	·07	·29	·08	·53	(·013)
A 2	79·29	19·56	·02	·18	·25	·70	(·040)
A 3	77·45	18·79	·09	·24	·28	3·15	(·045)
A 4	77·46	18·20	·65	·26	·28	3·15	(·045)
B 1	76·42	19·73	·60	·29	·18	2·78	(·030)
B 2	76·73	19·97	·35	·22	·19	2·54	(·032)
B 3	77·41	20·43	·12	·23	·38	1·43	(·064)
B 4	76·58	18·96	·88	·27	·57	2·74	(·096)
D	76·44	20·65	·54	·24	·19	1·94	(·032)
E	79·49	18·53	·17	·27	·52	1·02	(·084)
F	80·30	17·88	·10	·18	·57	·97	(·091)

TABLE F.—*Composition of the Megass.—Group I.*

Number of Plot.	Water.	Sucrose.	Glucose.	Ash.	Albu- minoids.	Unknown organic matters.	Fibre.	Nitrogen in Albu- minoids.
A 1	49.54	6.73	1.50	.81	.59	6.21	34.62	(.094)
A 2	49.84	7.62	1.68	.67	.77	4.30	35.12	(.124)
A 3	49.29	6.94	1.79	.71	.64	7.28	33.35	(.102)
A 4	49.72	7.12	1.88	.71	1.07	7.88	31.62	(.171)
B 1	46.10	7.06	1.66	.74	.92	9.92	33.60	(.150)
B 2	46.59	6.82	1.48	.88	.52	8.78	34.93	(.080)
B 3	45.16	6.72	1.97	.79	.53	10.47	34.36	(.085)
B 4	48.65	7.54	1.47	.83	.57	8.91	32.03	(.085)
D	48.10	8.01	1.58	.73	.31	7.63	33.64	(.050)
E	51.72	7.66	2.13	.72	.89	7.01	29.87	(.142)
F	51.08	7.01	1.38	1.31	.90	6.58	31.74	(.142)

From the foregoing tables it will be noticed that the increase in the nitrogen applied in the form of sulphate of ammonia, gave increased yields of total produce, and caused a continuous increase in the development of the individual cane; that, whilst the addition of 50lbs. of nitrogen per acre somewhat increased the amount of sucrose or crystallisable sugar present in the canes as compared with that present in the canes manured only with phosphates and potash, further additions of nitrogen decreased the proportion of sucrose, and considerably increased those of glucose and of unknown organic matters (gum, pectose, pectic acid, &c.) The canes grown with nitrates were much drier than those grown with ammonia salts, and came to maturity earlier. The increase in produce by the addition of nitrogen in the form of nitrates was less than in the manurings with ammonia salts, and did not so clearly show the gradual increase by the increased additions. It will be noticed, for instance, that 100lbs. of nitrogen applied as nitrate of soda gave only the same increase as 75lbs. applied as ammonia salts. The cause of this may perhaps be found in the heavy rainfall which occurred in the evening and during the night of the day succeeding the second application of the nitrogen in August, which may have caused loss of nitrogen by drainage, and, possibly, mixture of the various dressings of nitrates by washing. The greatest individual

development upon the plots manured with nitrates was upon that one to which potassium nitrate had been applied. With this exception, the canes grown with nitrate of soda as the source of nitrogen showed a tendency to a relatively greater leaf development than those grown with ammonia salts. The canes grown with nitrates were richer in sucrose and also in glucose, and yielded almost as much juice per cent. when expressed by the mill as the canes grown with ammonia salts. The excess of glucose in the juice of the canes grown with nitrates was noticed throughout the experiments. The greatest yield of produce was obtained by the manuring with stable manure, the individual canes grown with it exceeding in development any on the plots in this group manured with purely chemical manures. The canes manured with the artificial manuring adopted as best suited for the estate, gave results of considerable interest. As might have been expected from the manures only supplying 30 lbs. of nitrogen per acre, the total weight of the produce was less than on any of the plots receiving 50 lbs. or more of nitrogen, as sulphate of ammonia; but the relative development of the canes differed materially, the yield of tops being small and that of canes great. The individual canes were the largest grown in the whole of the experiments; gave a very large proportion of juice to the mill, which, although not so rich as the juice from other manurings in sucrose, was of great purity, whilst the proportion of fibre in the canes was low. As these results are practically identical with those obtained by the use of the Dissolved Peruvian Guano in the 1886 experiments, we feel inclined to ascribe them principally to the use of this highly complex manure.

The pecuniary results of the experiments in this group are briefly as follows: that the application of the purely mineral constituents of manures by producing only a very small increase in the available sugar per acre over the yield of the unmanured land caused a loss of about \$4.00 per acre, which the addition of 50lbs. of nitrogen per acre in the form of sulphate of ammonia changed to a profit of \$4.77, or in the form of nitrate of soda to one of \$2.64, and that the heavier dressings of nitrogen resulted in the case of 75lbs. as sulphate of ammonia to a diminished profit, and in the cases of all other dressings to actual loss, amounting in the case of 100lbs. of nitrogen as nitrate of soda to \$9.39 per acre. These results are due to the fact that, the increased produce of canes by the manuring being less rich in crystallisable sugar and containing more glucose, the extra yield of available sugar does not equal in value the extra expense of the

manurings. The same result is found in the case of the stable manure, which, whilst giving the largest return of available sugar, has resulted in an apparent loss of \$10·71. This is not, of course, as it is in the case of the purely chemical manures, an actual loss as the fertility of the soil will be increased for several years by the very heavy dressing. The greatest profit was obtained by the combination of "Ohlendorff's manures," this giving nearly as large a return per acre of available sugar as the stable manure, and thus producing a profit of \$15·67 per acre.

Group II.—Experiments with Phosphates.

This group consisted of two series with four plots each, situated on land decidedly more fertile than that of the nitrogen group; each of these plots received a manuring of 30lbs. of potash and 50lbs. of nitrogen, either in the form of sulphate of ammonia or of nitrate of soda, the plots marked A receiving the former, those marked B the latter. Plots A 6 and B 6 received only this manuring, plots A 7 and B 7 received in addition superphosphate containing 75lbs. of "soluble phosphates" and 5lbs. of "reverted;" plots A 8 and B 8, 112½ of soluble phosphates and 7½ "reverted;" and plots A 9 and B 9 150lbs. of "soluble" and 10lbs. of "reverted phosphates."

The results obtained in this group were somewhat unexpected, and, as will be seen from the following tables, are of very great interest and importance, not only to the practical planter but also to the chemists who are engaged in the scientific study of this plant, as possibly containing an explanation of the very discordant results recorded in experiments upon the sugar cane with phosphates.

TABLE F.—*Results of the Reaping of the Canes.—Group II.*

Number of plot.	Cost per acre of manure.	Number of canes per acre.	Number of canes in a clump.	Weight of produce per acre.	Weight of tops per acre.	Weight of canes per acre.	Average weight of a cane-top in lbs.	Average weight of a cane in lbs.	Average weight of a clump of stripped canes.	Gain in cwt. of produce per acre upon no manure.	Gain in cwt. of produce per acre upon A 6 or B 6 by addition of phosphates.
	\$ cts.			Tons cwt.	Tons cwt.	Tons cwt.					
A 6	9 96	14,640	12·2	36 7½	5 14½	31 13	·80	4·84	59·1	154	..
A 7	13 08	15,520	12·9	43 11½	6 3	37 8½	·88	5·40	69·8	298	144
A 8	14 64	14,400	12·0	42 0½	6 0½	36 0	·94	5·49	67·1	267	113
A 9	16 20	13,730	11·4	38 12½	5 9	33 3½	·90	5·40	62·0	199	45
B 6	10 16	14,360	11·9	33 10	5 4	28 6	·82	4·41	52·2	96½	..
B 7	13 28	15,440	12·9	38 8	5 17½	32 10½	·85	4·71	60·7	194½	98
B 8	14 84	15,240	12·7	38 18	6 2	32 16	·89	4·84	61·2	204½	108
B 9	16 40	15,000	12·5	32 18	4 13	28 5	·70	4·31	52·7	84½	—12

TABLE G.—*Results of the Grinding of the Canes.—Group II.*

Number of plot.	Imperial gallons of juice per acre.	Density ° Beaumé.	Percentage of juice yielded by the mill.	Lbs. of sucrose per gallon of juice.	Lbs. of sucrose in juice, per acre.	Percentage of glucose in juice.	"Available sugar," lbs. per acre.	Profit or loss by manuring or no manure.	Profit or loss by addition of phosphates to A 6 or B 6.
								\$ cts.	\$ cts.
A 6	3,927	11°	59·7	2·141	8,415	·09	8,364	+19 23	..
A 7	4,805	11°	61·9	2·123	10,201	·05	10,164	+38 61	+19 38
A 8	4,727	10·75°	63·2	2·089	9,873	·25	9,684	+31 04	+11 81
A 9	4,256	10·75°	61·7	2·109	8,976	·06	8,934	+20 11	+ 88
B 6	3,410	11°	58·1	2·172	7,406	1·02	6,840	— 04	..
B 7	3,875	11°	57·4	2·141	8,296	·51	7,977	+11 07	+11 11
B 8	4,030	11°	59·2	2·144	8,640	1·08	7,934	+ 8 97	+ 9 01
B 9	3,400	11°	58·0	2·177	7,402	1·06	6,818	— 6 54	— 6 50

TABLE H.—*Composition of the Canes.—Group II.*

Number of plot.	Water.	Sucrose.	Glucose.	Ash.	Albuminoids.	Unknown organic matter.	Fibre.	Nitrogen in Albuminoids.
A 6	66·54	15·09	·71	·42	·39	1·48	15·37	(·063)
A 7	66·99	15·36	·60	·41	·47	2·80	13·37	(·076)
A 8	67·28	14·76	·74	·39	·35	2·17	14·31	(·057)
A 9	64·65	14·42	·69	·41	·27	4·61	14·95	(·043)
B 6	63·63	14·42	1·32	·40	·31	3·05	16·67	(·049)
B 7	64·82	14·55	·93	·38	·40	2·81	16·11	(·063)
B 8	65·08	14·43	1·33	·40	·35	3·54	14·87	(·056)
B 9	63·81	14·67	1·34	·48	·25	2·91	16·54	(·041)

TABLE J.—*Composition of the Juice from the Mill.—Group II.*

Number of Plot.	Water.	Sucrose.	Glucose.	Ash.	Albuminoids.	Unknown Organic Matters.	Nitrogen in Albuminoids.
A 6	79.31	19.82	.09	.18	.25	.35	(.040)
A 7	78.61	19.65	.05	.23	.37	1.09	(.060)
A 8	78.42	19.38	.25	.22	.28	1.45	(.045)
A 9	77.30	19.56	.06	.20	.22	2.66	(.035)
B 6	76.88	20.11	1.02	.18	.24	1.57	(.041)
B 7	77.72	19.82	.51	.18	.25	1.52	(.043)
B 8	76.97	19.82	1.08	.18	.13	1.82	(.022)
B 9	76.82	20.16	1.06	.24	.13	1.59	(.022)

TABLE K.—*Composition of the Megass.—Group II.*

Number of Plot.	Water.	Sucrose.	Glucose.	Ash.	Albuminoids.	Unknown organic matters.	Fibre.	Nitrogen in Albuminoids.
A 6	47.62	8.08	1.64	.69	.61	3.20	38.16	(.097)
A 7	48.11	8.39	1.49	.72	.65	5.54	35.10	(.104)
A 8	48.15	6.65	1.59	.69	.50	3.52	38.90	(.080)
A 9	46.38	6.15	1.71	.81	.36	5.54	39.05	(.058)
B 6	45.28	6.54	1.74	.71	.37	6.28	39.08	(.059)
B 7	47.44	7.47	1.51	.65	.56	4.54	37.83	(.090)
B 8	47.84	6.62	1.69	.74	.66	5.99	36.46	(.106)
B 9	45.87	6.85	1.75	.83	.42	4.89	39.39	(.067)

The addition of nitrogen and potash salts without phosphates gave largely increased yields of produce as compared with that of the

unmanured plot D, whilst the addition to these soluble phosphates in superphosphate gave with one exception still larger yields. The superphosphate when applied in quantities containing 75lbs. of "soluble phosphates" per acre gave a very great increase both in the yield of produce and in the development of the individual cane; the further addition of 37½lbs. of "soluble phosphates" produced little or no further effect upon the produce and only a slight one upon the development; whilst the application of 150lbs. per acre of "soluble phosphates," or an addition of 75lbs. to the manuring of 75lbs., gave in one instance B 9 a slight decrease in produce upon the yield of B 6 (unmanured with phosphates) and in the other A 9 a much lessened increase. We notice, therefore, that whilst the results obtained in this group clearly point out the great importance of phosphates in manures for the sugar cane, they also show that heavy dressings are of little or no advantage beyond medium ones, and that very heavy dressings may actually reduce the yield below that obtained without them. Scattered through the literature of the sugar cane are to be found recorded experiments in some of which the addition of superphosphate to manures have produced large increases, others in which little or no increase has been produced, and others again where actual decreases have ensued. Unfortunately in few of these instances have experimenters reported the amount or the composition of the superphosphate used. In the experiments reported to His Excellency the Governor in April, 1886, results were obtained that led to the suspicion that very large proportions of soluble phosphates were not necessary for the sugar cane, notably the comparison of the yields upon plots 20, 11, and 16 on which the dressings of soluble phosphates were 87, 106, and 117lbs. per acre respectively and the produce obtained was very similar in amount, and upon plots 17 and 21 which received respectively 65 and 115lbs. of soluble phosphates per acre, the former of which gave slightly the better return. The apparent injurious action of the excess of "soluble phosphates" or of superphosphate may be due to its action upon the roots of the plant, the cane being essentially a surface feeder.*

(To be continued.)

* The superphosphate used throughout the experiments contained :—

"Soluble Phosphates"	30.76 per cent.
"Reverted Phosphates"	1.73 "
"Insoluble Phosphates"	2.69 "

and was free from excess of sulphuric acid and from uncombined phosphoric acid.

MARTINIQUE.

The *Sucrerie Indigène* gives the following extract from the journal *Les Antilles* :—

The colonial sugar factories have just closed the season under conditions which appear very satisfactory, in face of the low prices constituting the crisis, which has been affecting us for the last four

Some factories are, however, still turbinizing their lower qualities, or working over their last molasses.

This campaign, the greatest for ten years, exceeds even that of 1884, especially as regards the saccharine yield of the canes, which are much higher. The yield in 1884 was 7·90 per cent., that of 1886, 7·36. The figures for this year, as far as known up to now, will exceed those of 1886 by at least one per cent. We know several works where $8\frac{1}{2}$, $8\frac{1}{2}$, $8\frac{3}{4}$, and even $9\frac{1}{2}$ (for one of them) have been reached, and only one which comes near 8% without reaching it; this is undoubtedly a fine co-efficient to add as a final result to that of a large production.

May we be allowed to think that this fine campaign of 1887 is the result of improvements made in the cultivation in general, or in the manufacture? We do not think so. We lay the whole of the merit to a very steady rainy season during six months, allowing the cane to lengthen and thicken without interruption. We even think that the cutting which began generally in the colony before the 15th January, with constant rain until February 15th, might have been deferred for three or four weeks, with great advantage to the yield of the earlier months, and to the welfare of the *cheptel*.

The *Journal des Fabricants de Sucre*, apparently quoting from the *Propagateur* says :—

The sugar campaign in Martinique is drawing to an end, and the crop is estimated to exceed that of 1886 by about 35%. In other terms, the production of usine sugar, which last year was 24,500,000 kilos. (24,500 tons), will this year reach 33,000,000 kilos. (33,000 tons).

This extra production is uncontestably due to the very favourable circumstances of the season; the southern parts of the island principally have, in certain districts, had their crop doubled by climatic influences. However, it would be an injustice not to allow the cultivators their share of merit; the planters, in several instances, have

recognised the fact that by concentrating their efforts on the cultivation of a less superficial area they became more masters of their work, and could apply their labour more advantageously, and obtain from the soil a better result. We are glad to note the fact, and hope this lesson may be of use in the future.

The problem is to make a large quantity of sugar from a limited amount of land, thus necessitating reduced expenditure.

The campaign then, as regards the works, will be relatively a good one, and if prices were not so extremely depressed, agriculture and the industry might have hoped for a remuneration of their pains; perhaps they may succeed in making both ends meet.

SUGAR INDUSTRY OF BRAZIL.

MOVEMENT SET ON FOOT FOR A TREATY OF RECIPROCITY WITH THE UNITED STATES.

The following information, respecting the sugar industry of Brazil, is extracted from a recent report by the United States Consul at Rio de Janeiro :—

“I have before alluded to the precarious condition of the sugar industry of this country, and to the suggestion made in the Brazilian Chamber of Deputies, by a prominent and influential member of that body, that his Government should endeavour to obtain from the United States a reduction in the import duty on sugar, offering in compensation to reduce the duties on American merchandise imported into Brazil.

“The sugar merchants of this city held a meeting some time back, at which there was reached an exposition of the state of the sugar trade from which it appears that in some of the most important sugar districts of the Empire, the planters receive for their raw sugar only from one to two cents per pound, and that, in the opinion of the meeting (composed of some of the most prominent sugar merchants of this city) the country is seriously threatened with the total ruin of its sugar industry.

“It was therefore resolved ‘to organize an association for the purpose of defending the important interests now in jeopardy,’ and I observe that one of the articles of the programme of this association favours the policy of negotiating commercial treaties with sugar-consuming countries, and especially a treaty of reciprocity with the United States for the purpose of increasing the consumption of Brazilian sugar amongst its population, since that Republic is in a position to become the principal sugar market of the world.”

HAWAIIAN SUGARS SHIPPED TO NEW YORK.

The following from San Francisco may possess some points of interest for those engaged in the sugar trade :—

A circumstance that has hitherto attracted but little attention is the fact that several cargoes of Hawaiian raw sugars are now on the way or loading for New York from San Francisco. At present there are four cargoes, each of 2,500 tons, the first of which may be looked for any day, with two to follow at short intervals. These sugars are Hawaiian raws. It is several years since any attempt was made to place these sugars on the New York market, and that attempt resulted in considerable loss to the shippers, so no further attempt was made in this direction. But the cause of this new departure is not far to seek.

The Hawaiian sugar crop has been increasing to such an extent, owing to the remission of duties on raw sugars grown there through the terms of the reciprocity treaty with the islands, that the supplies received by the San Francisco refiners, who contract for the Hawaiian crops, have far exceeded the requirements of the Pacific coast trade. The result is that a market has to be found elsewhere. This has been done for several years past by the shipment of Hawaiian sugars that are refined in San Francisco to points east as far as the Missouri river. That they are able to do this is due to the special freight rates afforded by the trunk lines, which find it better to bring sugar east at low freights than to bring back empty cars. But the growth of the Hawaiian sugar crop has been such that even this outlet was not sufficient for all the surplus stocks on the Pacific coast.

It appears that the Hawaiian sugar crop of 1886, which was estimated at 100,000 tons, amounted to fully 110,000 tons. It is stated that this year's crop will not exceed 95,000 tons, but it may be safe to assume that the yield will be 100,000 tons. The requirements of the Pacific coast amount to about 50,000 tons, which will leave a surplus of about a similar amount to be disposed of elsewhere this year. The only available outlet is in the east, where the Hawaiian sugars are thus brought into competition with those of the eastern refineries and the Louisiana crop. A few years ago it was stated that the Hawaiian sugar crop would never exceed 60,000 tons. But it crept up to 80,000 tons, and then last year to 110,000 tons. The crop of 1888 will, it is confidently expected, be even still larger, as new

lands have been brought under cultivation, and the growing cane presents an excellent appearance. Unless a very dry season intervenes at the close of this year, which is an unusual occurrence on the islands, it will not be surprising if the 1888 sugar crop amounts to 120,000 tons. This would give a surplus of 70,000 tons to compete with eastern sugar either in its raw or refined condition.

As the capacity of one of the San Francisco refineries, which now controls more than half the stocks, is strained to its utmost, it is only reasonable to expect that an additional quantity of raw sugar will find its way to New York during the coming year, and that the shipments now on the way are only the forerunners of future larger and regular supplies. This is a matter of interest. Up to June 30 of the present year there had been shipped from San Francisco to eastern points no less than 32,500,000 pounds of sugar (14,518 English tons) by the regular overland lines of railroad. When the high freights ruled advantage was taken of the offers of the Canadian Pacific line to continue the shipments, as the high rate of freights from San Francisco to eastern points enabled the American refiners to resume control of the markets they had lost and undersell the San Francisco sugars at these points. There were sent from San Francisco, *via* Port-Moody, and thence through Canada to the Missouri, some 10,000,000 pounds additional of Hawaiian sugars. Then there is a further lot of 20,000,000 pounds (8,928 tons) on the way to New York direct, *via* Cape Horn, which gives a total of 62,500,000 pounds (27,900 tons) of Hawaiian sugars shipped east from San Francisco during the first six months of this year. A matter of 31,250 tons of sugar in six months may not play a very important part in the trade of New York refineries, but the growth of this competition should not be lost sight of, as it seems to be only the entering wedge of further supplies to come. If eastern refiners could also derive some benefits from the workings of the Hawaiian treaty, then there could be no possible objection to the receipt of any quantity of Hawaiian sugars. But as they have to pay duty on every pound of sugar that they import, it is likely that the influx of Hawaiian raws and refined into this market may meet with objection. In view of the large surplus stocks in other parts of the world, and the low value to which sugar has been forced of late, it is not likely that the arrival of Hawaiian raws in the New York market will meet with a very favourable reception.—*Glasgow Herald*.

CUBAN SUGAR INDUSTRY.

Mr. Acting-Consul Birch reports from Havana that last year planters "made an effort to cut down expenses and increase the yield of sugar by adopting the 'central factory' system; that is to say, by doing for sugar what has long been done for other crops, such as cotton and hemp, namely, separating the work of the cultivator from that of the manipulator for the market. This, so far, has been partially accomplished by the combination of several planters to grind the cane in one central mill, to which it is conveyed on tram lines from their different estates.

"Those planters who were able to adopt this system found the results satisfactory, and the merchants and buyers were much surprised by the return of 668,533 tons exported, 40,000 tons consumed, which, together with 41,865 tons in stock on the 31st December, reaches the enormous total of 750,938 tons; and deducting 18,675 tons which were in stock on January 1st, gives a total production for the year of 731,733 tons, as against 631,967 tons in 1885. Planters who were not able to adopt the central factory system divided their estates among small cultivators, who sent the cane to the nearest factory, and received back a percentage of the sugar extracted as their share of the profits. It has been estimated that the quantity raised in this manner was about 30 per cent. of the crop. The large total reached by the producers is the more remarkable from the fact that during the whole year complaints as to the scarcity of field hands were frequent and loud; and I am assured by men who have travelled through the sugar-growing districts, that much of the last crop remained in the fields, owing to the inability of the planters to find money for the gathering and grinding.

"The capabilities and fitness of this island to compete even with the low price of beetroot sugar in Europe seem to be sufficiently proved by this year's crop, and such would seem to be the opinion of an English engineer, who, after a long residence in Cuba, has bought land near Manzanillo, in the South-West of the province of Santiago de Cuba, and is growing sugar there; but there is no doubt that by far the larger number of planters have made no profit, and many of them have lost money on the crop of 1886. The more favourable view is, that the price at which sugar can be produced depends so much upon the quality of the 'plant' on an estate, that a planter whose

'finca' (farm) is supplied with the latest improvements in machinery can afford to make sugar at $4\frac{1}{2}$ 'reales fuertes,' say 2s. 4d. per arroba of 25 lbs., calculating the grinding at five months, from January to April.

"I have heard it stated by the manager of a sugar estate near Cardenas, that the percentage of sugar contained in beet in Europe is 12 per cent., of which 11 per cent. is all extracted by the manufacturers; while the cane in Cuba, although not of the best sort, contains 18 per cent. of sugar, of which only about 7 per cent. is extracted by the crushing process still in use here. The gradual adoption of the central factory and small farm systems, above referred to, is causing the manufacture of muscovadoes and clayed sugars to disappear, as each estate owner obtains the necessary plant, and turns his attention to centrifugal sugar. In spite of this, the proportion of 'clayed' and 'muscovadoes' to the whole crop has not decreased, although it is probable that these kinds will be scarcer in 1887."

MOVEMENTS IN THE PRICES OF COMMODITIES DURING THE FIRST HALF OF 1887.

From *The Economist*.

Although business during the past half-year has fallen below the expectations that were entertained when it began, there can be no doubt that activity has been quickened, and that the volume of our trade has distinctly expanded. This is proved by a few simple figures. First, as regards our foreign trade, the Board of Trade figures for the five months ending May show an increase in our imports of about $6\frac{3}{4}$ per cent. as compared with last year, while the total exports of home and colonial produce show a gain over 1886 of about $4\frac{1}{4}$ per cent. Again, the traffic returns of the home railways to date show a total gain in gross receipts over last year of over half-a-million sterling, or about $1\frac{3}{4}$ per cent., and of this gain nearly two-thirds is due to increased goods traffic. The significance, too, of these figures is heightened by the fact that, as a whole, rates are now somewhat lower than they were a year ago. The Bankers' Clearing House returns afford corroborative testimony of increased business. The total increase in the half-year's clearings amounts to £192,129,000, but of this £63,580,000 are due to an increase in Stock Exchange business. Deducting the latter, there is left an increase of

£128,549,000, or about $5\frac{7}{8}$ per cent., the whole of which is probably to be attributed to an expansion in the general trade of the country. It is, in fact, quite certain that trade has been upon a substantially larger scale during the past half-year than it was in the first half of 1886.

But at the same time, as the subjoined table shows, there has been no general rise in prices. Here and there an advance has taken place, due mostly to special causes; but, on the other hand, prices have in a few instances declined. The movements, as a whole, are, however, unimportant, and apart from one or two prominent exceptions, the general body of prices has remained steady during the half-year. The iron and steel market, which was decidedly active during the early part of the year, has recently shown less animation, owing to a falling-off in the American demand, and prices close lower. Copper has continued weak in price, for although the supply from Chili and elsewhere is declining, one of the great producers—the Rio Tinto Company—proposes to greatly increase its output. Tin has remained firm, the favourable statistical position neutralising the efforts of operators for the fall. In raw textile produce, the most important feature is the great advance which has taken place in the price of cotton, and as the slackened export demand, especially for the East, has prevented a corresponding rise in yarn and cloth, manufacturers have fared badly during the half-year. Wool has also declined, and there is a fall in flax and hemp, but jute is somewhat higher. In food products, wheat has receded in price, owing to satisfactory harvest prospects, and to the collapse of the “corner” at Chicago, formed by speculators for the rise. Other cereals are also lower. Meat has remained cheap, the market receiving large supplies from abroad. The violent movements in coffee are, of course, the main feature in Mincing Lane produce. Owing to the continued influence of the same cause that had governed prices for some time previously—a short Brazil crop—this commodity advanced hand over hand until a fortnight ago, when it fell heavy in consequence of the collapse of the speculation for the rise at New York. Tea has experienced a heavy fall, the supplies being excessive, but the sugar market has had a rather firm tone, although no distinct rise in prices has occurred. In both France and Germany the duties are likely to be altered, so as to return to the State part of the bounty now received by the producer.

THE LEADING MOVEMENTS QUARTER BY QUARTER.—FIRST HALF OF 1887.

	Dec. 25th, 1886.	Movements 1st Quarter.	March 26th, 1887.	Movements 2nd Quarter.	June 25th, 1887.	Extreme Variations in the Half-Year.
Scotch pig iron	44/1	— 1/9	42/4	— 1/2	42/11	40/10
Steel rails	85/-	+ 5/-	90/-	— 1/3	83/9	83/9
Coals—B. Wallsend	17/3	— 6d.	16/9	— 2/-	15/3	15/3
Copper—Chili	£38 1/2	+ £1 1/2	£39 1/2	+ £1 1/2	£38 5/8	£38 5/8
Tin—Straits	£100 3/4	+ £2 7/8	£102 3/4	+ £2 5/8	£99 1/2	£99 1/2
Lead—English	£12 1/2	+ £1 1/8	£12 3/4	+ £1 1/8	£12 1/2	£12 1/2
Wheat } Gazette {	33/11	— 9d.	33/2	— 1/2	35/1	32/6
Barley } average {	26/4	— 3/2	23/2	— 5/9	20/7	20/7
Oats	16/7	— 3d.	16/4	+ 2d.	16/9	15/8
Beef—Inferior	2/6	— 3d.	2/3	....	2/6	2/-
Do. Prime	4/-	— 6d.	3/6	+ 3d.	4/3	3/3
Mutton—Prime	4/6	....	4/6	+ 3d.	4/9	4/3
Sugar—West India	11/-	....	11/-	— 6d.	10/6	10/6
Coffee	74/-	+ 5/6	79/6	— 17/-	91/-	74/-
Tea (common)	5 1/2d.	— 1/2d.	5d.	+ 1d.	4 1/2d.	4 1/2d.
Rice	6/10 1/2	— 4 1/2d.	6/6	....	6/10 1/2	6/4
Cotton—Middling	5 1/2d.	+ 1 1/2d.	5 7/8d.	+ 5/8d.	5 1/2d.	5 1/2d.
Do. 40 mule twist	8 3/4d.	....	8 3/8d.	+ 3/4d.	8 1/4d.	8 1/4d.
Wool—South Down	1/-	— 1/2d.	11 3/4d.	— 1 1/2d.	10 3/4d.	10 1/4d.
Tallow	27/-	— 3/9	23/3	+ 2/-	23/3	21/9
Saltpetre	21/3	+ 4 1/2d.	21/7 1/2	+ 1 1/2d.	21/4 1/2	21/-
Hemp—Manila	£30 1/2	+ £1 1/4	£31 3/4	....	£30 1/2	£30 1/2
Silk—Cassimbuzar	15/-	+ 6d.	15/6	— 3d.	14/9	14/9
Jute	£12 1/2	+ £1	£13 1/2	+ £3 1/2	£13 1/4	£12 1/4
Flax	£32	....	£32	— 1 1/2d.	£28 1/2	£28 1/2
Petroleum	6 1/2d.	— 1 3/4d.	5 1/2d.	....	5 1/2d.	5d.

A TEST FOR SULPHUROUS ACID IN BEETROOT SUGAR.

So long as it is not quite settled whether beetroot sugar worked with sulphurous acid gas is equally well adapted for refining purposes with that worked with bone-black, it will always be important for the refiners to know whether the raw sugar, which they are using, has been produced by the one or the other process. I therefore venture to recommend the following test, which has the advantage of being easily made and being at the same time accurate. This test is based on the reducing properties of sulphurous and hyposulphurous acids on iodic acid, from which the iodine is liberated, the presence of the latter being then easily recognisable by the ordinary tests with starch solution. 1 to $1\frac{1}{2}$ grms. of the sugar to be tested is put into a test tube, and from 1.5 to 2cc. of very weak cold starch solution poured over it, a few drops of rather dilute iodic acid being added as soon as the greater part of the sugar is dissolved. By reason of the heavier specific weight of the sugar solution the iodic acid can, by carefully holding the test tube in a slanting position, be so added as to remain as a separate stratum on the top of the sugar without any mixing of the two liquids. Then, if the sugar contains even a trace of sulphurous or hyposulphurous acids, a blue ring appears either at once or in a short time between the two liquids. With first product sugars this test gives most satisfactory results, but with low after-products and molasses it is not always reliable, as they may contain other substances which also possess the property of reducing iodic acid. If a sugar has been found to contain sulphurous acid, and it is wished to ascertain the quantity, the following method is used:—10 grms. of sugar are dissolved in cold distilled water (which must also be free from air) and neutralised with sulphuric acid. Then, after adding a few drops of starch solution, it is titrated with 1/100 normal iodine solution until the blue colour remains permanent. Sugar which has not been worked with sulphurous acid requires, when tested in this way, about 0.3 c.c. of the iodine solution, while sugar worked with sulphurous acid combines with very varying amounts of free iodine. I have myself tested sugar, 10 grms. of which required 9.8 c.c. 1/100 normal iodine solution. This being calculated to sulphurous acid, the sugar is found to contain 0.03 per cent. of sulphurous acid, an amount that can hardly fail to produce some effect on the sugar in the process of refining.

“DIFFUSION” AT FORT SCOTT, LOUISIANA.

United States Department of Agriculture,
Division of Chemistry,

Washington, D. C., July 20th, 1887.

EDITOR, “SUGAR CANE,” Manchester, England.

Dear Sir,—In your journal for June 1st, page 297, is an article by Mr W. P. Kirchhoff, of New Orleans, in which he virtually accuses me of having falsified the returns of the sugar produced from Louisiana cane at Fort Scott, last year.

In the locality where Mr. Kirchhoff and myself are known, it would not be necessary for me to reply to such an accusation. Many of your readers, however, are unacquainted with either of us, and should these, omitting the imbecile juggling with figures, and the shameless liberties taken with facts in the body of his article, read only the closing paragraphs, they might feel inclined to believe the preposterous syllogism with which he closes.

Mr. Kirchhoff was sent last year, by private subscription, as a delegate from the Louisiana Planters' Association, to study the process of diffusion at Fort Scott.

Instead of attending to his duties he busied himself with collecting materials for a violent and malignant abuse of the undersigned.

So disgusted were the members of the Association with his conduct, that, when his report was made to the Association, it was referred to a committee as the quickest method of burial. On the other hand, the reports of Messrs. Barthelmy and Sieg, his *confreres* at Fort Scott, were published in full. As a further mark of the dissatisfaction with which his actions were received, I may mention that, at least, one of the most prominent members of the Association refused to pay the amount he had subscribed to Mr. Kirchhoff's expenses, because he had so grievously abused his privileges.

Mr. Kirchhoff was present during the whole course of the experiments; had access to the scales where the weighings of the cane and sugar were made, and knows perfectly well that his statements, insinuating that the amount of sugar made was less than the official report, is maliciously false. When the cane first came, and an analysis of it was made, Mr. Kirchhoff told me that the yield of such sugar cane in Louisiana, treated in the ordinary way, would be about 80 pounds per ton.

To take up the remarkable *melange* of figures with which Mr. Kirchhoff attempts to prove that the official records are false would be simply a waste of space. They all lead to the same result, and prove to anyone who will take the trouble to study them side by side with the official figures that they were inspired by any other than a simple desire for scientific criticism.

I shall take pleasure in sending, free of charge, a copy of Bulletin No. 14, to any of your readers who will send me their names and addresses.

As an illustration of the criminal disregard of facts which characterizes Mr. Kirchhoff's articles, I will call attention to what he says about the percentage of extraction on pages 298-9 of your journal.

His statement that the waste waters contained 1.24 percentage of sucrose is made without the authority of the Bulletin. In point of fact, compressed air was used to drive out the last charge of water from the chips, so that the total amount of waste waters was only a few litres from each cell. The exhausted chips contained a mean of .37 per cent. sucrose and .09 glucose, and yet, Mr. Kirchhoff would have you believe that the waste waters contained 1.24 per cent. sucrose. *Credat Judaeus Apella.*

The degree of extraction, however, is independent of any loss in the waste water great or small. It is determined by a direct comparison of the sugar contents of the chips before and after diffusion and the figures given in Bulletin No. 14, page 53, in which the degree of extraction of the sucrose is given as 96 per cent., are beyond the reach either of malicious criticism or disappointed hopes.

Mr. Kirchhoff in his efforts to discredit plain facts, attested not only by the official records, but also by the united testimony of those who weighed the cane, made the analyses and weighed the sugar produced, has placed himself in a position to merit the ridicule of all who will take the trouble to examine his fantastic calculations, did not his plain purpose to obscure the truth excite their contempt.

It would be idle to waste time in reviewing calculations in which, rejecting the official figures made by wholly disinterested parties, he assumes data said to have been collected by himself.

Mr. Kirchhoff's claim to scientific ability rests on grounds wholly unknown to the chemists of this country, among whom he is neither known nor recognized. Aside from this, however, no honorable man,

however much he might be swayed by personal enmity, would consent to indulge in the species of misrepresentation which characterizes the whole of his screed (tirade).

I am somewhat surprised, Mr. Editor, that you should have admitted such an article to your columns, since it plainly charges me with having reported a much larger yield of sugar than was really obtained.

From the few experiments made at Fort Scott, it is quite impossible to say, whether the process of carbonatation will prove practicable for making sugar from sugar cane, and I am always glad to see fair and candid criticism of the methods which are proposed and tried in this country to secure the successful establishment of an indigenous sugar industry. Perhaps another season may see our knowledge increased in this respect.

It is monstrous, however, that this irresponsible person should denounce me, all my assistants, and the Department of Agriculture, which we officially represent, as parties to a deliberate fraud, and I hereby characterize Mr. Kirchhoff's charge, that 144 pounds of sugar per ton were not obtained at Fort Scott, as a deliberate and malicious falsehood.

I have the honor to be, Sir,

Your obedient servant,

H. W. WILEY,

Chief Chemist U. S. Dept. of Agriculture.

NOTES ON BOOKS.

“REVUE UNIVERSELLE DES PROGRÈS DE LA FABRICATION DU SUCRE,” par M. François Sachs, Ingénieur à Gembloux (Belgium).

We have already several times noticed the appearance of this periodical detailed list of all the new discoveries connected with the sugar manufacture in various countries. The number now before us, forming the second part of the second volume, and embracing the period between 1884 and 1886, appears fully to sustain the reputation already acquired by the work.

“PURE WATER FOR MANUFACTURING PURPOSES AN ECONOMY NOT A LUXURY.”

Our attention has been called to the question of water filtration by a pamphlet, bearing the above title, issued by the Pulsometer

Engineering Company, Limited, 61 and 63, Queen Victoria Street, London.

In view of the considerable expense and inconvenience to which all manufacturers, who use any other water than pure rainwater, are inevitably exposed by the coating of their steam boilers, both in respect to the extra fuel required to heat a foul boiler, and to the costly and injurious process of "scaling" which becomes necessary from time to time,—we think we are doing a service to the larger number of our subscribers who employ steam, in calling attention to the statements made in this pamphlet. The number of those able to command a supply of even tolerably pure soft water is very limited, and the majority are compelled to use water containing in suspension a greater or less quantity of mud or other impurities, or holding salts of lime in solution. The filters supplied by the above named company appear to combine, with the utmost attainable degree of efficiency, the great recommendation of being susceptible of thorough cleansing. How to get rid of the filtered out matters has always been one of the great problems in the case of every kind of filter, and the Pulsometer Company has for some years been making costly experiments with the view of obviating this difficulty, and producing a filter which could be used on a large and remunerative scale, and would save the manufacturer the great cost and annoyance inseparable from the use of impure water. The results attained appear to have been so completely successful that the London Hydraulic Power Company, Limited, after twelve months' experience of four trial filters, eventually have had erected 10 machines capable of cleansing 25,000 gallons of Thames water per hour, the superficial area occupied by the whole plant being only 33 ft. by 8 ft. The experience gained in these experiments has been utilised by the Pulsometer Company in the invention of other forms of filters, which they claim must, along with those already mentioned, supersede all kinds hitherto in use, whether employing granular materials or charcoal, inasmuch as these latter can only act efficiently up to a certain point, whereas, by the new system, the filtering material is rapidly and thoroughly cleansed without removal. The *modus operandi* is exceedingly simple and intelligible, and the object, that of supplying a continuously efficient filter without any removal of the filtering medium, seems to be completely attained.

We recommend our friends to procure the pamphlet from the address given above, and peruse it for themselves.

“THE APPLICATION OF COMPRESSED HOT AIR IN THE CLARIFYING OF SYRUPS AND MOLASSES IN SUGAR FACTORIES AND REFINERIES.” Patented by Messrs. C. Bureau & Co., Ingénieurs Civils, Lille.

Specification.

The action of the centrifugal force not being sufficient to divest the crystals of their viscous and liquid covering, it has been the custom hitherto to introduce, near the centre of the turbine, a jet of ordinary or of dry rarefied steam, or, again, a mixture of air and steam, to assist in the separation of the crystals.

The employment of these various proceedings is defective; it has the inconvenience of causing a considerable loss of sugar, resulting from the melting of the sugar crystals by the steam, and of producing very moist sugar, and consequently difficult to preserve. This latter inconvenience is especially noticeable in the case of raw sugars (*sucres roux*).

To arrive at the production of a very dry sugar and obtain the greatest yield possible from the turbine, Messrs. Ch. Bureau & Cie., have conceived the idea of employing compressed air, heated to a temperature sufficient to permit the complete liquefaction of the syrup, but incapable of melting the crystals which are desired to be cleared from it.

Apparatus.

Arranged as follows:—

1. A condenser sending cold air into.
2. A closed receiver, furnished with a steam coil, which heats the air to the desired temperature indicated by a thermometer placed so as to be fully visible.
3. A general conduit conveying the condensed air to the turbines.
4. Special pipes for each turbine.
5. Turbines on the centrifugal principle.

The whole is completed by stop-cocks regulating the admission of cold air into the receiver, the egress of the hot air from the receiver, and the distribution of the condensed hot air to one or another of the turbines.

One or more receivers may be fixed, communicating with one another or shut off by stop-cocks, so as to heat the cold air gradually, or to store it up.

Advantages.

The use of hot compressed air, employed as stated above in the clarification of the turbines, affords the following advantages:—

1. Sugar of a higher standard (titrage).
2. The production of a very dry sugar, which remains unchanged for a long time.
3. An increased yield, owing to the stoppage of the melting of the finer sugar crystals.
4. Increased facility of work, owing to the cloths *toiles* of the turbines becoming less easily choked.

Steam, as now applied, melts the small crystals, which then form sticky laminae, choking up the holes in the cloth (*toile*) of the turbine, a defect which is entirely obviated by the use of hot compressed

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, F.C.S., M.I.M.E.,
6, Lord Street, Liverpool; 6, Bank Street, Manchester; and
323, High Holborn, London.

ENGLISH.

APPLICATIONS.

8748. WILLIAM T. CROOKE, London. *Improvements in pockets or bags employed in the manufacture of sugar and like substances, together with an improved process for cleaning the same.* 17th June, 1887.

9690. CARL LEUCLËNBERGER and BERNHARD MOISKE, London. *Improvements relating to the purification of molasses and other saccharine solutions.* 9th July, 1887.

10842. L. E. A. PRANGEY, London. *Improvements in the manufacture of sugar, and in the apparatus to be employed therefor.* 8th August, 1887.

ABRIDGMENTS.

9569. W. BURNS, Leith, N.B. *Improvements in the manufacture of depurating and decolorizing charcoal for purifying sewage and other foul liquids, and for decolorizing syrups.* 24th July, 1886.

FOR DECOLORIZING PURPOSES:—

Ground chalk or limestone	..	8	parts by weight.
„ clay	.. . . .	3	„ „ „
„ coal	.. . . .	12	„ „ „
„ bones	.. . . .	11	„ „ „
Wood sawdust	.. . . .	20	„ „ „
Animal dung	.. . . .	40	„ „ „
Blood	.. . . .	6	„ „ „

are ground into a uniform dough, moulded into bricks, dried, calcined, treated while hot in the retort successively with HCl and steam, cooled, withdrawn, and ground to a fine powder.

GERMAN.

ABRIDGMENT.

38755. GEHR. FORSTREUTER, Oschersleben. *Improved counter current condenser*. 30th June, 1886. The condenser, which is intended to condense the vapour of sugar refineries, is fixed in front of the air pump, and has inside it a perforated partition with an overflow pipe, a water bag, and a series of water trays, arranged alternately on the right and left sides. The water, which has to be brought into as intimate a contact with the steam as possible, enters through a pipe at the side near the top of the apparatus, forms first a sheet on the sieve partition, and then falls step by step on the water trays. As all the partitions are made in severed parts, they can easily be removed for cleaning purposes.

38755. FORSTREUTER BROS., Oschersleben. 30th June, 1886. *Counter current condenser*. This condenser which is designed to condense the vapours evolved during the evaporating process of sugar manufacture is provided inside with an upper perforated diaphragm above which a short pipe delivers the water, a water collecting recipient, and below this, a series of plates placed alternately right and left. The water comes through the above first pipe and into intimate contact with the steam as it falls through the diaphragm on the plate below and from this to the next on the other side and so on. As these plates are made in parts, they are easily removed through the openings provided at the upper and lower parts for the purpose of cleaning the condenser and removing the deposits that have accumulated therein.

39279. EMIL HEFFTER, Altjauer, near Jauer Silesia. 22nd June, 1886. *A process for clarifying sugar syrup by means of tannic acid (tannin)*. In order to obtain in the well known process of clarification of sugar syrups, by means of tannic acid, a coarse flaky precipitate, easy to filtrate, certain test conditions must, according to the observations of the inventor be strictly adhered to. The juicer resulting from the concentration of the thick syrups and containing at least 0.05 of free lime are used; they are cooled down to 25 or 40°C, then mixed with tannic acid in sufficient quantity to reduce the alkaline contents to 0.04. To complete the clarifying process, the liquid is heated with the precipitate up to 80 or 90°C.

38669. LEOPOLD MAY, Ungarisch Ostra. 26th February, 1886. Improvements in automatic packing, breaking or cutting machines. The new machine is characterised by the following new improvements: 1. The application of two pairs of parallel striking knives, of which one pair is used to cut off the less valuable ends of long narrow lengths of sugar prior to their being reduced into cubes. 2. A moveable plate which is loaded with the cubes of sugar, and a slide having an up and down motion for the purpose of retaining the cubes whilst the moveable plate is effecting its return motion. 3. An automatic downwards periodical motion of the packing case. This motion takes place every time a layer of sugar pieces has been placed in the case. The amount of this motion is always equal to the thickness of one layer and is determined by a system of spring locks, draw bars and counterweight, suitably connected with the moveable plate.

38737. NAAMLÖÖZE VENNOOTSEHAAP WESTER-LUIKER, Raffinadery, Amsterdam. *Improvements in centrifugals used for the purpose of producing refined sugar in plates.* 25th March, 1886. The basket or cage of the centrifugal is provided inside with radial V separating piece. The space left between two of these separating pieces is rectangular so that the mass submitted to the centrifugal action enters these spaces and assumes the shape of a plate. Each piece is besides provided at the lower part with a projection and with a handle at the top. When the process is over, the separating plates are withdrawn along with the sugar plates formed, which are resting on the sides and the lower projections.

7259. F. HARM, Kurtwitz, Prauss, Germany. *Improved process for converting the syrups from sugar manufacture into mono-saccharates.* 18th May, 1887. The claim is as follows:—In the manufacture of raw and refined sugar, the process consisting essentially in conducting the syrups from the first product in a diluted state, and with the addition of sugar and sweetening waters, and, if required, further dilution with water, to a saturating station, in the admixture of a sufficient quantity of lime for the formation of mono-saccharate, in the separation by means of carbonic acid and purification.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

WEEKLY STATEMENT OF COMPARATIVE PRICES OF RAW

For the last Fifty-two Weeks, compared

		German Beetroot 88 o/o Prompt, free on board.						French Crystals. No. 3, f.o.b.			West India. Good Brown.			Java afloat. No. 15 and 16.		
		1886.		1885.		1884.		1886.	1885.	1884.	1886.	1885.	1884.	1886.	1885.	1884.
July	2..	11/1½		15/4½	15/10½	13/6	13/9	14/6	19/-	17/9	11/3	14/9	12/-	13/6	18/3	17/3
	9..	11/3	11/4½	15/9	15/4½	14/-		14/3	18/6	18/3	11/3	14/-	12/3	13/7½	17/9	17/3
	16..	11/6	11/7½	15/-	14/7½	13/7½	13/9	14/6	18/-	17/6	11/3	13/3	12/3	13/7½	17/-	17/3
	23..	11/3		14/-	15/-	13/6	13/3	14/6	17/9	17/6	11/-	13/6	12/-	13/6	16/9	17/-
	30..	11/3	11/4½	15/-	15/1½	13/3	13/1½	14/3	17/6	17/6	11/-	13/6	12/-	13/4½	16/9	17/-
Aug.	6..	11/-	10/10½	14/7½	14/10½	12/9	12/7½	13/9	17/6	17/-	11/-	13/3	11/6	13/3	16/9	16/9
	13..	11/-	11/1½	14/9	15/4½	12/-	11/6	13/4½	17/6	16/6	11/-	13/6	10/9	12/-	17/-	16/3
	20..	11/3	11/1½	15/-	14/10½	12/-	12/3	13/4½	17/9	16/6	11/-	13/9	11/-	12/9	17/6	16/-
	27..	11/1½	11/-	15/7½	15/6	12/9	12/6	13/4½	18/6	16/9	10/9	14/-	12/6	13/-	18/-	16/3
Sept.	3..	11/-	10/10½	15/7½	15/9	12/4½	12/6	13/4½	19/-	16/6	10/9	14/6	12/-	13/-	18/3	16/-
	10..	11/1½	11/3	16/1½	16/-	12/3		13/6	19/-	16/6	10/9	15/-	11/6	12/3	18/6	16/9
	17..	11/6	12/-	15/6		11/6	11/-	14/-	19/-	16/-	11/-	14/9	10/6	13/9	18/3	15/6
	24..	12/-	11/9	15/3	15/1½	11/-	10/9	14/-	18/6	15/6	11/-	14/3	10/-	14/3	17/9	15/-
Oct.	1..	11/9	11/1½	15/-	14/9	9/10½	10/-	13/9	18/-	14/9	11/-	14/-	9/9	14/3	17/9	14/6
	8..	11/-	10/10½	15/-	15/4½	10/7½	10/9	13/3	18/6	14/6	10/9	14/3	10/6	13/9	18/-	14/6
	15..	10/9		15/6	14/7½	11/9	11/3	13/-	17/9	15/-	10/9	13/9	11/6	13/6	17/9	15/6
	22..	10/9		15/-	14/9	12/6	12/-	13/-	17/6	18/-	10/9	13/9	12/-	13/3	17/6	16/3
	29..	10/3	10/4½	14/3	14/4½	11/6	11/4½	12/9	17/6	15/6	10/9	13/6	11/6	13/1½	17/6	16/-
Nov.	5..	10/1½	10/3	14/-	14/1½	11/-		12/9	17/6	15/3	10/6	13/6	11/-	13/1½	17/3	15/9
	12..	10/6	10/7½	14/6	14/7½	10/10½		13/-	17/6	15/-	10/6	13/9	11/-	13/3	17/-	15/6
	19..	10/10½	10/7½	15/-	15/1½	10/7½		13/6	17/9	14/6	10/9	14/-	10/6	13/6	17/6	15/-
	26..	10/9		14/9	15/-	10/1½		13/4½	17/9	14/6	10/9	14/3	10/6	13/4½	17/6	15/-
Dec.	3..	10/9	10/10½	15/1½		10/3		13/3	19/6	14/6	10/9	14/6	10/3	13/3	17/9	14/6
	10..	11/6	11/1½	15/7½	15/6	10/-	10/1½	13/4½	17/9	14/3	10/9	15/-	10/-	13/9	18/-	14/3
	17..	11/6	11/-	15/7½		10/-	10/1½	13/6	17/9	14/3	10/9	15/-	9/9	13/7½	18/-	13/9
	24..	11/-		15/6		10/-	10/1½	13/6	17/9	14/3	10/9	15/-	9/9	13/6	17/9	13/9
	31..	11/-		15/6	15/7½	10/1½	10/3	13/6	18/-	14/3	10/9	15/-	9/9	13/6	17/9	14/-
Jan.	7..	11/3	11/1½	15/7½	15/9	10/3		13/9	18/-	14/3	10/9	14/9	9/9	13/7½	17/9	14/-
	14..	11/1½		14/9		11/3	11/-	13/9	17/6	15/3	10/9	14/3	10/6	13/4½	16/9	15/-
	21..	11/4½	11/1½	15/-	14/7½	11/6	11/3	13/9	17/6	15/3	10/9	14/3	11/-	13/6	16/4½	15/-
	28..	11/1½	11/-	14/-		11/10½	11/4½	13/9	17/-	15/3	10/9	14/-	11/-	13/6	16/3	15/-
Feb.	4..	11/-	10/7½	13/9	14/-	11/-	11/6	13/9	16/9	15/3	10/9	14/-	11/-	13/6	16/-	14/3
	11..	10/9		13/7½		11/7½	11/9	13/9	16/9	15/-	10/9	14/-	11/-	13/4½	15/9	14/9
	18..	10/9		12/6	12/9	11/9	11/10½	13/6	16/-	15/3	10/9	13/3	11/3	13/5	15/-	15/-
	25..	10/6		13/3	12/10	12/1½	12/3	13/6	16/-	15/9	10/6	12/9	11/6	13/-	15/6	15/3
March	4..	10/7½		13/1½	13/3	12/6	11/10½	13/6	15/9	15/9	10/6	13/-	11/6	12/9	15/6	15/3
	11..	10/10½	10/9	13/-	12/10½	12/3	11/9	13/6	15/9	16/-	10/6	12/9	11/6	13/1½	15/6	15/-
	18..	10/9		12/4½		11/10½	12/-	13/6	15/6	16/-	10/6	12/6	11/6	13/3	14/6	15/-
	25..	10/10½	11/-	12/6		12/-	12/3	13/6	15/3	16/-	10/6	12/6	11/6	13/6	14/9	15/-
April	1..	11/3	11/4½	12/3		12/6	12/1½	13/7½	15/3	15/9	10/9	12/6	11/6	13/6	15/-	15/3
	8..	11/4½		12/7½	12/9	12/1½	12/3	13/9	15/9	15/9	10/6	12/9	11/9	13/6	15/-	15/3
	15..	11/7½		13/-	13/1½	12/3	12/4½	13/10½	15/9	15/9	10/9	12/9	11/9	13/9	15/6	15/3
	22..	11/3		13/6		12/9	12/7½	13/9	16/-	15/9	10/9	13/-	11/9	14/7½	15/9	15/3
	29..	11/7½		13/9	13/1½	13/-	12/10½	13/7½	16/-	16/-	10/9	13/-	12/-	13/7½	15/9	15/6
May	6..	11/4½	11/10½	13/3	13/-	14/-	13/10½	13/6	15/9	17/-	10/9	12/9	12/9	13/7½	15/6	16/3
	13..	11/9	11/10½	12/9	12/7½	14/6	14/9	13/6	15/6	18/-	10/9	12/6	13/3	13/6	15/-	16/9
	20..	12/-	11/10½	12/-		16/-	15/3	13/6	15/3	19/-	10/9	12/-	15/-	15/6	14/3	18/6
	27..	11/10½	12/-	11/9		17/-	16/9	13/6	14/9	19/6	10/9	11/9	15/9	13/3	14/-	19/-
June	3..	11/6	11/7½	11/1½	15/10½	16/4½		13/6	14/3	19/-	10/9	11/6	15/6	13/4½	13/6	18/9
	10..	11/9	11/10½	10/6	16/-	16/4½		13/4½	13/9	19/3	10/6	11/-	15/-	13/6	13/3	18/9
	17..	12/-	12/9	10/10½	17/-			13/7½	14/-	19/6	10/9	11/-	15/6	13/7½	13/4½	19/-
	24..	12/3	13/-	11/1½	10/10½	16/-	16/1½	14/3	14/3	19/3	11/-	11/3	15/3	13/10½	13/6	18/6

AND REFINED SUGAR, JULY, 1886, TO JUNE, 1887, INCLUSIVE,

with those of the two previous years.

		Tate's Cubes.			Martineau's Titlers.			Say's Loaves, f.o.b.			Lebaudy Loaves, f.o.b.		
		1886.	1885.	1884.	1886.	1885.	1884.	1886.	1885.	1884.	1886.	1885.	1884.
July	2...	20/3	23/-	24/-	18/-	21/3	21/9	22/-	—	—	20/6	16/-	20/-
	9...	20/3	22/6	24/-	18/3	21/3	22/-	—	16/6	20/-	20/3	16/-	20/-
	16...	20/3	21/6	24/-	18/3	21/-	22/6	—	—	19/6	20/3	16/-	20/-
	23...	20/3	21/9	24/-	18/3	21/-	22/6	—	—	—	20/3	16/3	19/9
	30...	20/-	22/-	23/9	18/3	20/6	22/3	22/6	—	19/6	20/3	16/-	19/9
Aug.	6...	20/-	22/-	23/9	18/3	20/6	22/-	22/6	—	—	—	16/-	19/9
	13...	20/-	22/3	23/6	18/3	20/6	22/-	—	—	—	—	16/-	19/6
	20...	20/-	22/6	23/-	18/3	20/9	21/6	—	—	20/-	20/-	16/-	19/3
	27...	20/-	23/-	23/6	18/3	21/-	21/6	21/9	—	—	19/9	15/9	19/3
Sept.	3...	20/-	23/3	23/-	18/3	21/3	21/6	—	—	—	19/9	15/6	19/3
	10...	20/-	23/6	23/6	18/3	21/6	21/-	—	16/6	22/3	19/9	15/6	19/-
	17...	20/3	23/-	22/-	18/3	21/6	20/6	—	—	22/3	—	16/-	18/6
	24...	20/3	22/6	21/6	18/3	21/3	19/6	20/-	—	21/6	19/-	16/-	18/6
Oct.	1...	20/-	22/-	21/-	18/3	21/-	19/-	—	—	20/9	18/6	15/6	—
	8...	20/-	22/-	21/3	18/3	21/-	18/6	19/-	—	20/9	18/-	15/6	20/6
	15...	20/-	22/-	21/6	18/-	21/-	19/-	19/6	—	20/9	18/6	15/6	—
	22...	20/-	22/-	22/-	18/-	20/9	19/6	20/-	—	20/6	19/-	15/3	—
	29...	20/-	22/-	21/6	17/9	20/9	19/6	20/-	—	20/-	19/-	15/-	—
Nov.	5...	20/-	22/-	21/-	17/6	20/6	18/9	19/-	—	—	18/6	14/9	—
	12...	19/6	22/-	21/-	17/6	20/6	19/-	—	15/-	19/6	18/6	14/9	—
	19...	19/6	22/-	20/6	17/3	20/6	18/9	—	15/-	19/6	—	14/9	—
	26...	19/6	22/6	20/6	17/3	20/9	19/-	—	—	19/6	18/-	14/9	17/6
Dec.	3...	19/6	22/6	20/6	17/3	21/-	19/-	—	—	19/6	18/-	14/9	17/6
	10...	19/6	23/6	20/6	17/3	21/3	18/9	—	15/6	20/-	18/-	15/-	19/3
	17...	19/6	23/-	20/6	17/3	21/3	18/6	—	15/6	20/-	—	15/-	—
	24...	19/6	23/-	20/-	17/3	21/-	18/-	18/3	—	19/9	—	—	18/3
	31...	19/6	23/-	20/6	17/3	21/3	18/-	18/3	—	19/9	17/6	—	18/3
Jan.	7...	1887.	1886.	1885.	1887.	1886.	1885.	1887.	1886.	1885.	1887.	1886.	1885.
	14...	19/-	23/-	20/-	17/-	21/3	21/6	18/-	—	—	17/-	15/-	16/-
	21...	19/-	23/-	21/-	17/-	21/3	—	18/6	19/-	—	17/3	—	19/6
	28...	19/3	22/6	21/-	17/3	21/-	—	18/6	19/-	—	17/3	15/3	16/9
Feb.	4...	19/-	22/-	20/9	17/3	20/6	—	15/6	—	—	17/3	15/3	16/9
	11...	18/9	21/9	20/6	17/3	20/3	18/3	18/6	—	—	—	—	18/-
	18...	18/9	21/6	20/9	17/-	20/3	18/6	18/9	—	—	—	15/-	18/-
	25...	18/9	21/-	20/9	17/-	19/9	18/3	—	15/3	—	—	—	—
March	4...	18/9	21/-	20/9	17/-	19/3	18/9	—	—	—	17/6	14/9	17/3
	11...	18/9	21/-	20/-	17/-	19/3	18/3	18/6	—	17/6	—	14/9	—
	18...	18/9	20/9	20/-	17/-	19/-	18/3	—	—	—	—	14/9	17/-
	25...	18/9	20/9	20/-	17/-	19/-	18/-	18/3	—	17/3	—	14/9	17/-
April	1...	18/9	20/9	20/6	17/-	19/-	18/3	—	15/-	—	—	14/9	—
	8...	19/-	21/-	20/-	17/-	19/-	18/-	18/3	—	17/3	—	17/-	—
	15...	19/3	21/3	20/6	17/-	19/3	18/3	18/6	—	17/6	17/3	—	17/3
	22...	19/-	21/6	21/-	17/-	19/3	18/9	—	—	17/9	17/9	14/10½	17/6
May	6...	18/9	21/6	21/9	17/-	19/6	20/-	—	15/-	—	18/9	14/9	—
	13...	19/-	21/-	22/6	17/-	19/3	21/-	—	—	—	19/-	14/9	17/3
	20...	18/9	20/6	23/3	17/-	19/-	21/9	22/-	—	—	20/6	14/10½	17/3
	27...	18/9	20/6	24/6	17/-	18/9	22/6	—	—	17/3	21/-	14/10½	17/3
June	3...	18/9	20/-	24/-	17/-	18/3	22/-	—	—	—	—	14/10½	16/9
	10...	18/9	20/-	23/-	17/-	18/-	21/6	—	—	16/6	20/6	14/10½	—
	17...	19/-	20/-	23/6	17/-	17/9	21/6	—	—	16/6	—	14/10½	16/-
	24...	19/3	20/-	23/-	17/-	18/-	21/6	—	15/3	—	—	15/6	16/-

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO JULY 31ST, 1886 AND 1887.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1886.	1887.	1886.	1887.
	Cwts.	Cwts.	£	£
Germany	3,097,754	3,781,722	1,978,769	2,040,521
Holland	203,046	258,051	132,071	139,753
Belgium	433,948	497,738	279,714	260,729
France	12,050	18,464	7,135	11,052
British West Indies & Guiana	1,466,276	1,727,277	1,169,694	1,219,362
British East Indies	417,143	218,009	227,168	99,387
China and Hong Kong	44,226	312	26,394	201
Mauritius	222,434	76,040	144,666	40,160
Spanish West India Islands	14,756	153,098	11,135	94,690
Brazil	422,577	453,391	282,861	239,826
Java	3,356,467	2,493,510	2,503,404	1,622,518
Philippine Islands	279,847	165,825	154,436	75,355
Peru	350,178	226,395	257,584	137,435
Other Countries	437,271	330,740	318,013	186,735
Total of Raw Sugars ..	10,757,973	10,400,572	7,493,043	6,167,724
Molasses	—	—	58,266	68,526
Total Raw Sugars	—	—	7,551,309	6,236,250
REFINED SUGARS.				
Germany	980,925	1,605,357	840,620	1,226,676
Holland	647,405	838,709	572,931	649,401
Belgium	65,328	114,631	61,020	94,559
France	330,836	901,310	306,591	674,545
United States	729,781	724,458	650,306	578,749
Other Countries	821,360	26,408	672,319	19,297
Total of Refined	3,575,685	4,210,873	3,103,787	3,243,227

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	78,034	64,207	55,559	34,508
Belgium	30,530	24,157	22,100	14,648
France	30,984	22,445	23,733	13,829
Portugal, Azores, & Madeira	48,936	54,622	36,607	31,204
Italy	54,684	49,565	39,319	30,557
British North America	7,549	9,964	7,104	6,194
Other Countries	197,344	176,418	155,011	118,490
Total	448,061	401,378	339,433	249,430

SUGAR STATISTICS—GREAT BRITAIN.

To AUGUST 20TH, 1887 AND 1886. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1887.	1886.	1887.	1886.	1887.	1886.
London	72	120	199	195	195	223
Liverpool ..	86	106	166	159	175	168
Bristol	3	7	40	37	40	36
Clyde	44	64	144	147	152	145
Total ..	205	297	549	538	562	572
	Decrease..	92	Increase..	11	Increase..	10

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. To JULY, 1887 AND 1886.

	STOCKS.		DELIVERIES.		IMPORTS.	
	August 1st.		In July.		In July.	
	1887.	1886.	1887.	1886.	1887.	1886.
New York	147	145	63	78	50	96
Boston	18	24	20	20	18	21
Philadelphia	5	7	14	17	14	18
Baltimore . . . . .	..	..	..	..	..	..
Total	170	176	97	115	82	135
	Decrease ..	6	Decrease ..	18	Decrease ..	53
Total for the Year	—	—	722	666	790	785

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, August 18th, 1887.

FAIR REFINING.	96o/o CENTS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
Aug. 18, 1887.—4 9-16c.	5 5-16c.	5 $\frac{7}{8}$ -15-16c.	5 9-16c.	Jan. 1, 1887—102,279 tons.
Aug. 19, 1886.—4 9-16c.	5 3-16c.	6 1-16c.	5 9-16- $\frac{7}{8}$ c.	Jan. 1, 1886— 57,328 tons.
Aug. 20, 1885.—5 $\frac{1}{2}$ c.	6c.	6 11-16c.	6 $\frac{1}{4}$ - $\frac{3}{8}$ c.	Jan. 1, 1885— 89,186 tons.
Aug. 21, 1884.—4 13-16- $\frac{7}{8}$ c.	5 $\frac{3}{4}$ c.	6 9-16c.	6 $\frac{1}{4}$ c.	Jan. 1, 1884— 60,900 tons.
Aug. 23, 1883.—6 19-16c.	7 9-16c.	8 9-16c.	8 1-16c.	Jan. 1, 1883— 50,297 tons.
Aug. 24, 1882.—7 $\frac{1}{8}$ c.	8c.	9 $\frac{1}{8}$ c.	8 $\frac{3}{4}$ c.	Jan. 1, 1882— 43,927 tons.
Aug. 25, 1881.—7 11-16c.	8 $\frac{1}{2}$ c.	9 $\frac{3}{8}$ -11-16c.	9 $\frac{1}{4}$ c.	Jan. 1, 1881— 66,999 tons.
Aug. 19, 1880.—7 $\frac{3}{4}$ c.	8c.	10 $\frac{1}{2}$ c.	10 $\frac{1}{4}$ - $\frac{1}{2}$ c.	Jan. 1, 1880— 63,558 tons.
Aug. 21, 1879.—6 $\frac{3}{4}$ c.	7 11-32c.	5 $\frac{3}{4}$ - $\frac{1}{2}$ c.	8 $\frac{1}{4}$ - $\frac{1}{2}$ c.	Jan. 1, 1879— 50,773 tons.
Aug. 22, 1878.—7c.	7 $\frac{3}{4}$ c.	9 $\frac{1}{2}$ c.	9c.	Jan. 1, 1878— 48,230 tons.
Aug. 23, 1877.—8 $\frac{3}{4}$ c.	8 15-16c.	10 $\frac{3}{8}$ - $\frac{1}{2}$ c.	10-10 $\frac{1}{8}$ c.	Jan. 1, 1877— 25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST JULY, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
221	140	40	31	37	19	488	628	695

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST JULY, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
1218	461	50	408	197	334	2668	2421	2594

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP,
OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1887-88.	1886-87.	1885-86.	1884-85.
	Tons.	Tons.	Tons.	Tons.
France.....	550,000 ..	500,000 ..	298,407 ..	308,410
German Empire ..	1,000,000 ..	1,012,500 ..	838,131 ..	1,154,817
Austro-Hungary..	450,000 ..	525,000 ..	377,032 ..	527,766
Russia and Poland.	440,000 ..	475,000 ..	537,860 ..	386,433
Belgium	110,000 ..	91,120 ..	48,421 ..	88,463
Holland and other Countries	50,000 ..	50,000 ..	37,500 ..	50,000
Total.....	2,600,000	2,653,620	2,137,351	2,545,889

Mr. Licht makes no alteration, from last month, of his estimate of the current campaign.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

There has been during the past month an extraordinary movement in beet sugars, which, owing to the large "bear" sales on the Continent for August shipment, ran up in price, to speculators, several shillings per cwt.; from 12s. 7½d. the price rapidly rose until, at one time, it reached 19s.

The quotations for legitimate business are slightly higher, all round, than they were a month ago.

There is a good deal more confidence felt in present values. Mr. Licht has not altered his estimate for the coming crop, from last month, and it is thought not unlikely that it may have to be reduced by fifty to seventy thousand tons. Altogether the indications point upward.

The imports of American refined in July amounted to 3371 tons, and for the seven months 36,220 tons, against 39,112 tons for the corresponding period of 1886. The total increase in the imports of refined this year, as compared with 1886, is nearly 30,000 tons.

The deliveries in the United Kingdom up to 20th August show an increase over 1886 of 10,611 tons, and the imports a decrease of 9436 tons.

The stocks in the United Kingdom on 20th August were 204,997 tons, against 296,999 tons for 1886, or a decrease of 92,002 tons.

Present quotations for the standard qualities, as under, are:—

	FLOATING.	Last Month.
Porto Rico, fair to good Refining	12/- to 12/6 against	12/- to 12/6.
Cuba Centrifugals, 96% polarization	13/3 to 13/6 ,,	13/- to 13/3.
Cuba Muscovados, fair to good Refining..	12/- to 12/6 ,,	12/- to 12/6.
Java, No. 14 to 15, good to strong	14/- to 14/3 ,,	13/9 to 14/-.

	LANDED.	Last Month.
Madras Cane Jaggery.. .. .	9/- to 9/6 against	8/6 to 9/-.
Manilla Cebu and Ilo Ilo	9/- to 9/6 ,,	8/6 to 9/-.

Paris Loaves, f.o.b.	15/4½ to 15/6 ,,	15/- to 15/1½.
Titlers	18/- ,,	17/3
Tate's Cubes.. .. .	19/6 ,,	19/3
Austrian-German Beetroot, 88% f.o.b. ..	12/10½ ,,	12/7½

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 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

At pages 526 and 527, we give a further list of German Sugar Companies, showing the result of the year's working 1886-87. One company declares a dividend of 35%—the others range between $2\frac{1}{2}\%$ and 7%.

A meeting is convened for October 3rd, at 3 o'clock p.m., in Hyde Park, for the purpose of giving the workmen of London an opportunity of protesting against the injustice of the Foreign Bounty System. There will be six separate platforms, so that a large number of speakers will be able to take part in the proceedings.

An interesting event came off at Liverpool on the 23rd September. The Hahnemann (Homœopathic) Hospital, which has been built, furnished, and completed at the expense of Mr. Henry Tate, was opened and formally presented to the City of Liverpool.

A company of capitalists in New York, Boston, and Philadelphia, has been formed for the purpose of erecting in Philadelphia what it is said will be the largest refinery in the world. The capital, which has been raised, is £600,000.

There is no truth in the report that Mr. Clifford Lloyd will go to Jamaica as Colonial Secretary. It appears that Mr. Neal Porter, at present Secretary to the Leeward Islands, will succeed Mr. Edward Noel Walker in Jamaica, and that Mr. Walker will take the place of Mr. Clementi Smith as Colonial Secretary of Ceylon, and leaves for Ceylon in the course of this month.

The *Nueva Era*, a fortnightly publication devoted to the agricultural and industrial interests of the island of Cuba, published at Roque, made its appearance in a new form on 1st June, after a suspension of several months. The editor, Senor Santiago Dod, has for three years done his best to keep his readers *à la hauteur* of the progress realised by sugar manufacturers, planters, and chemists, and to supply, along with sound advice, every kind of information which could contribute to the material advance of Cuban agriculturists and planters and merchants.

We learn that the West Indian Association have determined to close their "room" in the Royal Exchange Buildings, Glasgow. In the days when the harbours of Glasgow, Port Glasgow, and Greenock swarmed with vessels bringing sugar from the West Indies, the "room" was a necessity; but now that the receipts in Greenock of West India sugars are only about five per cent. of the total, whilst those from Java form forty per cent.—the balance consisting of beet sugar—it is found to be useless continuing it. "The West India Room" has been in existence for eighty-one years.

In the southern portion of the State of Florida, especially in the valley of Kassimnee, where thousands of acres of the most fertile land have been made available by draining, a beginning was made about three years ago with cane cultivation, and the results are said to be of such an extraordinarily favourable nature, that a company has been formed for carrying on the production of sugar on the largest scale. At Kassimnee a huge sugar factory is now being erected, the machinery being brought from New Jersey at a cost for carriage alone of £2,000.

The land need be very fertile, and very cheap also, to set against the enormous first cost of the plant, and the cost of keeping it in repair.

The protest adopted by the *Chambre Syndicale* of the Syndicate of sugar manufacturers, of which we gave a translation in our last, has been unanimously endorsed at the sitting of the Syndicate, held at Paris, on the 15th September. The following is a translation:—

"The Syndicate of the sugar manufacturers, met in general assembly, on the 15th September, adopting the deliberations of its *Chambre Syndicale* on the 14th August, opposes with its utmost

energy any convention, having for its object the abolition of the premiums granted to the sugar manufacture, and begs the Government to make known its decision as promptly as possible, so as to reassure our agriculturists and manufacturers whose interests are too often brought under discussion and threatened.

It protests with all its strength against the vexatious measures adopted against the manufacturers by the Administration des Contributions indirectes, in view of the application of the law, measures which can have no other result than to lower their industry, and the manufacturers themselves, in the consideration of their fellow citizens and of foreign countries.

It protests, likewise, against the duty of 30 centimes, which is a perfectly exceptional measure, in formal contradiction to the rules which regulate the levying of duties in France, and it consequently demands its suppression."

It appears that the *Temps*, the *Liberté*, and the *Republique Francaise*, have been attributing to the speech of M. Sans Leroy, at the banquet of the 16th September, a meaning which the shorthand reports as now published, by no means warrant, viz., the expression of an opinion that the present state of the budget would not allow of the maintenance of the law of 1884, even in a modified form.

The following is from the *Sucrerie Indigène*, 27th September (signed by M. H. Tardieu, the Editor):—"According to the *Prager Zuckermarkt*, it is a matter of notoriety that the International Conference on Sugar is to meet at London about the end of October. This time the Conference will take place, although the results at which it may arrive are still very problematical. According to a statement lately made by Mr. (Sir James) Fergusson, Under-Secretary of State in the Foreign Office, Austria, Germany, Holland, Italy, Spain, and Denmark have already accepted unconditionally. Belgium accepts with the reservation of refining in bond. France, Russia, Brazil, and Norway and Sweden have also given their assent.'

The *Prager Zuckermarkt* adds that the answer of France was waited for with great interest, for the partisans of the system of premiums were of opinion that unless she participated in the Conference, no practical result would ensue, and it was known that the project of a Conference was very badly received in France, as is proved by the protest of the Syndicate of Manufacturers, of which our contemporary gives a tolerably complete analysis.

We repeat these reports here without guaranteeing their correctness, for it would be painful to us to think that the arcana of diplomacy were so profound in our democratic republic, that a deputy acquainted with them, and speaking before a public so deeply interested in the question as that of the banquet of the 15th September, should not have said a word that might at least have given a hint of this acceptance on the part of the French Government. Perhaps our illusion may soon vanish before the reality. Let us wait!"

The *Deutsche Zuckerindustrie*, in publishing the conditions for the sale of raw sugar to refiners, as settled by the delegates of the Union of Beet Sugar Manufacturers of the German Empire, remarks:—

"For our part we can only most earnestly recommend the raw sugar manufacturers to adhere to these conditions. As the requirements of refiners are the greatest just at the beginning of the campaign, they will soon be compelled to give in, and the successful resistance of the raw sugar manufacturers to the one-sided proceedings of the inland buyers, will, in future, exercise a favourable influence on the action of the foreign buyers."

The following we take from *Willett, Hamlen & Co's New York Circular* of September 15th:—

PRODUCING COUNTRIES.—Stock in Cuba—Entire Island—September 1st, was 80,000 tons, against 125,000 tons at same time last year. This means decreased receipts from Cuba. Only a small quantity of sugar is reported remaining in the British West Indies, and it is possible we may be nearing the end of the increased receipts from thence. Accounts from the Beet crop are more favourable, and purchases for America have been renewed to extent of 10,000 tons, at 12s. 10½d. @ 13s. per cwt., c. & f. The Philippines promise a smaller crop than the last, Mauritius a slight increase. Growing cane crops as a whole promise about the same as last year, while the Beet crop will be smaller, hence the production of the coming 12 months will be smaller than the consumption as it is going on, and surplus stocks should fast disappear. The Louisiana crop is at hand earlier than usual, and estimate large, but the South is bare of sugar and waiting eagerly to begin its consumption largely at home.

SECOND ANNUAL REPORT OF THE AGRICULTURAL
STATION ESTABLISHED IN BARBADOS IN 1885.

(Continued from page 480).

In this group (II) it will be noticed that in every experiment the superiority of sulphate of ammonia to nitrate of soda, under the existing conditions, as a source of nitrogen is well marked, the former giving from three to five tons per acre more produce on the parallel experiment than the latter. The canes richest in sucrose were those grown with 75lbs. of soluble phosphates upon the plot where nitrogen was applied as sulphate of ammonia. The canes grown with nitrate of soda were characterised by containing much glucose in their juice. The yield of available sugar per acre was greatest in both cases with the manuring of 75lbs. of soluble phosphates, less with that of 112½lbs., and very much less with that of 150lbs.; in consequence the financial results show that whilst considerable profit was obtained by the addition of the 75lbs. of phosphates to the nitrogen and potash manuring, a lessened profit was obtained by the addition of 112lbs. and a still smaller one, or in the case of the nitrate plot a considerable loss, by the manuring with 150lbs. It will also be noticed that as in Group I., the profits from the use of nitrate of soda were much less than from the use of sulphate of ammonia.

Group III.—Experiments with Potash.

This group, like the preceding one, consisted of two series of four plots each, and was upon soil a little less fertile than that of the phosphate group, but more fertile than the nitrogen one. Each of these plots was manured with superphosphate, supplying 94lbs. of soluble and 6lbs. of reverted phosphates per acre, and with 50lbs. per acre of nitrogen either in the form of ammonia salts or nitrate of soda, the plots marked A receiving the former, and those marked B the latter. Plots A 10 and B 10 received nothing further, A 11 and B 11, sulphate of potash, supplying 40lbs. of potash per acre. A 12 and A 13 sulphate of potash, supplying 60lbs., and A 13 and B 14 the same substance, supplying 80lbs. of potash per acre.

The following tables give the results of the experiments:—

TABLE L.—*Results of the Reaping of the Canes.—Group III.*

Number of plot.	Cost per acre of manures.	Number of canes per acre.	Number of canes in a clump.	Weight of produce per acre.	Weight of tops per acre.	Weight of canes per acre.	Average weight of a cane-top in lbs.	Average weight of a cane in lbs.	Average weight of a clump of stripped canes in lbs.	Gain in cwt. of produce per acre upon no manure.	Gain in cwt. of produce per acre upon A 10 or B 10 by addition of potash.
	\$ c.			Tons cwt.	Tons cwt.	Tons cwt.					
A 10	12 23	15,640	13·0	39 0½	6 8½	32 12	·92	4·67	60·8	207	..
A 11	14 36	13,010	10·8	37 16	4 7	33 9	·74	5·76	62·4	182½	— 24½
A 12	15 42	14,360	11·8	39 3½	4 15½	34 8	·74	5·35	64·0	210	+ 3
A 13	16 48	14,600	12·1	39 6	5 7	33 19	·82	5·20	63·3	212½	+ 5½
B 10	12 43	14,720	12·2	34 17½	5 13½	29 4	·86	4·44	54·5	124	..
B 11	14 56	14,640	12·2	37 0½	5 11½	31 9	·86	4·81	58·7	167	+ 43
B 12	15 62	14,360	12·0	36 1	5 10½	30 10½	·86	4·76	57·0	147½	+ 23½
B 13	16 68	13,654	11·4	34 14½	5 8½	29 6½	·88	4·73	54·9	121	— 3

TABLE M.—*Results of the Grinding of the Canes.—Group III.*

Number of plot.	Imperial gallons of juice per acre.	Density ° Beaumé.	Percentage of juice yielded by the mill.	Lbs. of sucrose per gallon of juice.	Lbs. of sucrose per acre.	Percentage of glucose in juice.	"Available sugar," lbs. per acre.	Profit by manuring on no manure.	Profit by addition of potash to A 10 or B 10.
		°						\$ c.	\$ c.
A 10	4,030	11·25	59·8	2·039	8,217	1·16	7,456	5 61	..
A 11	4,480	10·75	64·5	2·128	9,541	·07	9,494	28 65	23 04
A 12	4,495	10·50	61·7	2·068	9,295	·09	9,233	24 63	19 02
A 13	4,500	11	63·9	2·154	9,693	·10	9,570	27 78	22 17
B 10	3,565	11	58·8	2·159	7,696	·50	7,407	4 79	..
B 11	3,783	11	57·9	2·144	8,110	·60	7,742	6 85	2 06
B 12	3,875	11	61·7	2·172	8,416	·39	8,169	11 13	6 34
B 13	3,687	11·5	61·9	2 188	8,068	·42	7,822	5 73	94

TABLE N.—*Composition of the Canes.—Group III.*

Number of Plot.	Water.	Sucrose.	Glucose	Ash.	Albuminoids.	Unknown organic matters.	Fibre.	Nitrogen in Albuminoids.
A 10	65.52	14.38	1.33	.40	.36	2.28	15.73	(.058)
A 11	68.74	15.37	.61	.35	.50	2.47	11.96	(.080)
A 12	67.37	14.67	.71	.43	.35	3.19	13.08	(.056)
A 13	67.70	15.50	.60	.39	.41	2.86	12.54	(.065)
B 10	64.92	14.76	.88	.45	.32	3.65	15.02	(.051)
B 11	64.81	14.17	.94	.41	.37	3.88	15.42	(.059)
B 12	66.28	14.94	.79	.39	.30	3.08	14.22	(.049)
B 13	64.84	15.13	.80	.43	.32	4.35	14.13	(.052)

TABLE O.—*Composition of the Juice from the Mill.—Group III.*

Number of Plot.	Water.	Sucrose.	Glucose.	Ash.	Albuminoids.	Unknown organic matters.	Nitrogen in Albuminoids.
A 10	77.71	18.81	1.16	.18	.26	1.88	(.042)
A 11	79.27	19.74	.07	.24	.22	.46	(.035)
A 12 ...	79.03	19.20	.09	.24	.26	1.18	(.042)
A 13	77.08	19.94	.10	.20	.35	2.33	(.056)
B 10 ...	77.46	19.99	.50	.27	.13	1.65	(.022)
B 11	77.39	19.85	.60	.23	.15	1.78	(.025)
B 12	77.65	20.11	.39	.22	.11	1.52	(.019)
B 13	76.68	20.02	.42	.25	.17	2.46	(.028)

TABLE P.—*Composition of the Megass.—Group III.*

Number of Plot.	Water.	Sucrose.	Glucose	Ash.	Albuminoids.	Unknown organic matters.	Fibre.	Nitrogen in Albuminoids.
A 10	47.40	7.78	1.59	.72	.51	2.87	39.13	(.082)
A 11	49.61	7.44	1.61	.56	1.03	6.00	33.75	(.165)
A 12	48.60	7.34	1.72	.73	.50	6.96	34.15	(.080)
A 13	51.12	7.66	1.49	.74	.52	3.74	34.73	(.084)
B 10	47.02	7.32	1.43	.72	.57	6.49	36.45	(.092)
B 11	47.50	6.37	1.40	.68	.65	6.78	36.62	(.105)
B 12	47.97	6.60	1.45	.69	.61	5.55	37.13	(.098)
B 13	45.61	7.14	1.42	.73	.57	7.45	37.08	(.092)

In this group, as in the preceding ones, the superiority of sulphate of ammonia to nitrate of soda is strongly marked. The manurings with nitrogen and phosphates only have in both cases given large returns, in fact greater than those given by nitrogen and potash only. The addition of potash salts in the large proportions used have not produced any well marked increase in the total produce per acre: in fact in two instances the total produce per acre was less than on the plots without potash. By examining the individual development of the canes we find that the addition of potash has produced a considerable increase, the canes grown on plot A 11 (40lbs. of potash) with sulphate of ammonia being the finest grown in that series, and those on plot B 11 (40lbs. of potash) with nitrate of soda, the finest in that series. It is noticeable that the application of the potash salts, especially in the ammonia series, apparently checked the luxuriant leaf development produced by the nitrogen and phosphate manuring, and largely increased the tendency to the development of the canes. Taking the weight of the canes produced we find that the application of potash salts has in each case increased this. This increased development of cane produced a considerable increase in the number of gallons of juice obtained per acre especially in the ammonia series. The juice obtained from the sulphate of ammonia and phosphate manuring was less rich in sucrose, and contained a very large percentage of glucose as compared with that from the plots manured in addition with potash, thus reducing the amount of "available sugar" contained in it. As this was not noticeable on the nitrate of soda plot, it is impossible to say whether it was due to the manuring or to some unknown cause. It is also noticeable that the canes richest in sucrose obtained during the experiments were upon some of the plots heavily manured with potash, whilst the next richest canes were obtained on plot A 7, on which the phosphates were comparatively low in proportion to the potash, and on plots A 6, (ammonia and potash without phosphates), and D, the unmanured one. Whether this is due to the potash is a point which requires further investigation. It is, however, worthy of notice that over a quarter of a century ago M. Krajenbrink, in certain manurial experiments which he made upon the sugar cane in Java, noticed this phenomena, and reported that "it is evident that ashes exert a special action upon the saccharine richness of the sugar cane." The pecuniary results of the experiments in this group show us that whilst manurings of only superphosphate and ammonia salts may be profitably employed, the addition to such manuring of potash salts give largely increased profits, and in the case of manurings with nitrate of soda and phosphates also increase the profit but to a lesser extent. In this group as in the nitrogen and in the phosphate group, the pecuniary advantage of manuring with sulphate of ammonia instead of nitrate

of soda is well shown. It is important to notice that the use of heavy dressings of potash salts does not tend to increase the proportion of glucose in the juice as feared by many persons.

The effects of the manures upon the proportions of phosphoric anhydride and of potash contained in the canes.

It is important to ascertain the effect of manuring the canes with the mineral constituents of manures upon the proportions of the substances contained in them, and more especially in the juice since the mebasogenic action of potash salts is well proved. It was found impossible to make, within a reasonable time, separate determinations of these substances in each of the samples of juice and megass obtained from the experiments. Average samples of the juice and of the megass from the plots unmanured with any constituent under experiment, and from the plots manured with this constituent were therefore taken, and the determinations made on them. The results of these determinations are given in the following table:—

TABLE R.—*The percentage of phosphoric anhydride and potash in the canes grown during the experiments.*

Numbers of Plots.	Description of Manuring.	Percentage of Phosphoric Anhydride in the juice.	Percentage of Potash in the juice.	Percentage of Phosphoric Anhydride in the megass.	Percentage of Potash in the megass.	Percentage of Phosphoric Anhydride in the canes.	Percentage of Potash in the canes.
D	No manure	·011	·051	·034	·117	·043	·080
A 1	{ Phosphates						
	{ Potash	·009	·099	·181	·115	·077	·105
{ A 2 A 3	{ Phosphates						
{ A 4 B 1	{ Potash	·003	·094	·153	·067	·065	·083
{ B 2 B 3 B 4	{ Nitrogen						
E	Farmyard Manure ..	·016	·141	·116	·221	·055	·172
F	Ohlendorff's Manures	·012	·097	·206	·144	·078	·111
{ A 6	{ Nitrogen						
{ B 6	{ Potash	·010	·073	·087	·076	·041	·074
{ A 7 A 7	{ Nitrogen						
{ A 9 B 7	{ Potash	·016	·103	·130	·172	·061	·130
{ B 8 B 9	{ Phosphates						
{ A 10	{ Nitrogen						
{ B 10	{ Phosphates	·022	·058	·110	·076	·058	·065
{ A 11 A 12	{ Nitrogen						
{ A 12 B 11	{ Phosphates ..	·014	·063	·093	·095	·044	·075
{ B 12 B 13	{ Potash						

It is evident that the larger proportion of the phosphoric anhydride in the cane remains in the megass whilst of the potash the larger proportion is found in the expressed juice. The application of the superphosphate and potash manures without nitrogen caused a considerable increase in the amounts of both constituents, and especially of the potash in the juice and of the phosphoric anhydride in the megass, which the addition of nitrogen caused to somewhat decrease. The very heavy dressing of stable manure produced canes containing a high proportion of potash both in the juice and in the megass, whilst the proportion of phosphoric anhydride is also somewhat increased. In the canes grown with the Ohlendorff manures the potash in the juice is much less than in those grown with the stable manure, and only very slightly higher than in those grown with the phosphates, potash, and nitrogen. By comparing the amounts found in the canes grown without and with phosphates, we find that the proportion both of phosphoric anhydride and of potash present were considerably increased by the addition of the phosphates, the latter in a much higher ratio than the former. By comparing the phosphoric anhydride and potash present in the canes grown without and with potash, we notice that the potash present in the juice and in the canes was only a little increased by the addition of it in the manuring. It appears that whenever we have produced a luxuriant growth of canes the proportion of potash present in the juice has had a tendency to increase, and that we cannot with certainty connect this with the increased proportions of potash added in the manures.

Summary of conclusions arrived at on the action of the manures.

1. Manuring the sugar cane with only the mineral constituents of manures is useless, the cane not having the power, as stated by M. Ville, of assimilating free nitrogen from the air.
2. The addition of readily available nitrogen to the purely mineral manures produce large increases in the weight of canes grown, but excessive dressings, (over 3 cwt. of sulphate of ammonia to the acre) cause a marked decrease in the richness and purity of the juice.
3. Under the climatic conditions existing at *Dodds* during the years 1885, 1886, and part of 1887, and upon the soil of the experimental fields, nitrate of soda was decidedly inferior to sulphate of ammonia as a source of nitrogen.
4. The addition of superphosphate in moderate proportions to

manurings of nitrogen and potash causes a very great increase in the yield of canes, and in the available sugar in the juice per acre.

5. The addition of superphosphate in quantities beyond that capable of supplying about 75lbs. of "soluble phosphates" per acre (equivalent to about 16% of "soluble phosphates" in commercial sugar cane manures when applied in the ordinary rate of one ton to five acres) does not produce a corresponding increase, and if applied in very large proportions may even reduce the produce below that obtained from manuring with nitrogen and potash only.

6. The addition of potash to manurings of superphosphate and nitrogen may not increase the yield of total produce to any very marked extent, but from its tendency to increase the development of the cane causes a large increase in the amount of "available sugar" in the juice per acre.

7. The presence of potash in the manures in rather high relative proportions apparently tends to increase the amount of sucrose in the canes. This point is worthy of further investigation.

8. The presence of an excess of potash in the manures does not injuriously affect the purity of the juice by increasing the glucose, or appreciably the amount of potash salts contained in it.

The proportion of sugars remaining in the megass.

The results of the analyses made in 1886 taken in connection with those made this year enable us to form an approximate idea of the amount of total sugars lost by remaining in the megass, after the crushing of the canes by mills capable of yielding with good average cane from 60 to 65% of their weight in the form of juice. In 1886, with canes averaging only 12·44% of total sugars, 10·29% was obtained in the juice and 2·15% or 17·3% of total sugars, remained in the megass. In 1887, the canes averaged 15·59% of total sugars, 12·15% was obtained in the juice, whilst 3·44% or 22·06% of the total sugars, was lost in the megass. We may safely, therefore, consider that on an average, mills which are here considered good ones, leave 20% of the sugar grown, to be burnt in the megass. As the average percentage of fibre in the canes grown during the experiments was 13·96, and the average percentage of total sugars in the juice was 19·97, if we calculated, as is still frequently done, the composition of the canes from these data, and neglected to take into consideration the fact that

the juice left in the megass is very much poorer in total sugars than that expressed, we should say that the canes contained 17·18% of sugars, and that we had lost 29·27 of the sugars in the megass, thus leading us to form exaggerated ideas of the richness of our canes, of the loss of sugar by the crushing, and of the advantage to be gained either by maceration, double crushing, or diffusion.

PART III.

Experiments with different varieties of the Sugar Cane.

The object of these experiments and also of those with manures are so well stated in a paper by M. J. A. Krajenbrink of Java, published originally in the *Journal de L'Agriculture des Pays Chauds*, and afterwards in No. 9 (April, 1870,) of the *Sugar Cane* that we consider no excuse is necessary for quoting his words.

1st. "Can we increase the richness of the cane juice represented by the proportion of crystallizable sugar contained in one gallon without at the same time diminishing the proportionate quantity of juice yielded?"

2nd. "Can we obtain a larger number of canes (to each stool) without injury to their development and without injuring their richness in juice or sugar?"

M. Krajenbrink states that the answer to these questions will be found in the judicious use of different manures. We believe that the results of the experiments given in the preceding and in the following tables, will tend more to direct the planters of Barbados to continue their attempts to improve our present Bourbon cane, which like most other cultivated plants have been improved by continuous careful cultivation and by an unconscious kind of natural selection on the part of the planters, by the use of manures, rather than to supplant it by a new variety.

In the following tables I and II* the varieties, the names of which are in italics, are those either at present cultivated or existing in this island. The Bourbon canes were taken from a field manured with the Ohlen-dorff's manures and were fair average canes from the field, the different varieties were grown upon various fields and the manuring varied

*See pages 519 and 520.

somewhat, but were all cultivated under conditions which would have ensured very large returns from the ordinary variety. By reference to table B, it will be found that the yield of crystallisable sugar per acre by the Bourbon cane upon unmanured land was 6,083lbs., a return exceeding, with one exception, that obtained from any of the different varieties upon manured land. The results obtained from the varieties either cultivated to only a slight extent or the cultivation of which has been here abandoned, show that the Barbados planters have selected from the varieties previously at their disposal the one best suited to their island and climate. With the exception of the Mauritius cane, the varieties selected by Mr. Morris, do not exhibit under present conditions of cultivation, any well-marked characteristics to recommend them to the planters. It is difficult to reconcile our results with those obtained by Mr. Morris in Jamaica, and we can only ascribe ours to two causes, either that owing to the unfavourable climatic conditions existing during 1885 and the first six months of 1886, and to the change of soil, climate, and culture, these varieties, originally good ones, have greatly deteriorated, but may, when adapted to these new conditions, gradually regain their favourable characteristics; or that the varieties are altogether unsuited for the soil and climate of Dodds. The Mauritius cane exhibits characteristics which lead us to consider that it may be a valuable acquisition to this island, and it will be well worth the attention of our planters to try by judicious manuring, to remedy its weak points, namely its comparative dryness and the poorness and impurity of its juice. We strongly recommend to our planters experiments with this variety in the different districts of the island. Of the remaining varieties the Keni-Keni and the Norman are the most promising. It is very noticeable, however, the close resemblance in point of yield per acre exhibited by many of the new varieties from Jamaica to those varieties previously tried here, and the cultivation of which has been, to a great extent, abandoned. It is our opinion that far more good is likely to accrue to the planters of this island by the careful cultivation, the more scientific manuring, and especially the more careful selection of the plant canes of our present Bourbon variety than by the introduction of different varieties from elsewhere. It is the almost unanimous experience of sugar cane planters "that every region is peculiarly adapted to the culture of one or other variety of cane, although science cannot accurately determine the causes."

The experiments at present carried on.

From the results obtained we have considered it desirable with His Excellency the Governor's sanction, to somewhat modify the lines of the experiments. We propose to limit the comparison of sulphate of ammonia and nitrate of soda, to the nitrogen group, and to add experiments using organic matters (dried blood, flesh, &c.,) as the source of the whole or portions of nitrogen used. We further propose to add the dressing of nitrogenous organic matters and of a portion of the superphosphate and potash to certain of the plots soon after the planting of the canes, instead of adding, as at present, the whole of the manures in June or July. In the phosphate group we propose to compare the action of precipitated phosphates and finely ground mineral phosphates, applied in equal money value, with that of the varying amounts of superphosphate. We have also commenced the cultivation of the different varieties under identical conditions of culture and manuring, and hope next year to be able to give their complete compositions and characteristics.

In addition to the gentlemen already mentioned, our thanks are due to the Barbados Railway Company for the loan of weighing apparatus; to Mr. J. C. Armstrong, overseer at *Bushy Park*, for valuable assistance rendered during the grinding of the canes; and to Mr. H. T. Donovan, the Assistant in the Laboratory, for assistance in making the numerous analyses required. Our efforts have also been ably and willingly seconded by the various officers of Dodds Reformatory.

We have the honour to be, Sir,

Your most obedient Servants,

J. B. HARRISON, M.A.,

Island Professor of Chemistry and Agricultural Science.

JOHN R. BOVELL,

Superintendent Reformatory.

The Honourable C. C. Knollys, M.A.,

Colonial Secretary.

TABLE I.—Results of the Reaping of the Canes.

Name of Variety.	Number of canes per acre.	Number of canes in a clump.	Weights of produce per acre.		Weights of tops per acre.		Weights of canes per acre.	Average weight of a cane top in lbs.		Average weight of a clump of stripped canes.	Increase or decrease of produce upon Bourbon in cwt.		Increase or decrease in canes upon Bourbon in cwt.	per acre.
			Tons.	Cwts.	Tons.	Cwts.		Tons.	Cwts.		+	—		
<i>Bourbon</i>	10,710	8.9	33	17	3	18	29	19	.82	6.26	55.9	+	47	
<i>Mauritius</i>	16,320	13.6	37	0	4	12	32	8	.63	4.45	60.5	—	219	
<i>Ribbon</i>	10,470	8.4	22	7	3	7	19	0	.71	4.07	35.5	—	180½	
<i>Keni-Keni</i>	9,120	7.6	23	15	2	16½	20	18½	.69	5.14	39.07	—	145	
<i>Naga</i>	18,600	15.5	26	5	3	11	22	14	.43	2.73	42.4	—	217½	
<i>White Transparent</i> ..	10,800	9.0	22	1½	3	0	19	1½	.62	3.95	35.6	—	43	
<i>Elephant (Barbados)</i> ..	12,000	10.0	33	16	6	0	27	16	1.12	5.19	51.9	—	164½	
<i>Norman</i>	10,200	8.5	25	5	3	9½	21	15½	.76	4.78	40.6	—	291½	
<i>Sacri</i>	14,850	12.4	18	2	2	14½	15	7½	.41	2.32	28.7	—	298	
<i>Purple Transparent</i> ..	12,960	10.8	18	4	3	3	15	1	.54	2.60	28.0	—	257½	
<i>Salangore</i>	12,000	10.0	19	18	2	16½	17	1½	.53	3.19	31.8	—	289	
<i>Manuri</i>	21,900	18.2	19	4½	3	14½	15	10	.38	1.58	29.0	—	239	
<i>Batramic</i>	22,740	18.9	22	16	4	16	18	0	.47	1.76	33.3	—	309½	
<i>Demerara ?</i>	11,640	9.7	16	11	2	1½	14	9½	.40	2.78	27.0	—	315	
<i>Bouronappa</i>	16,800	14.0	17	1	2	17	14	4	.38	1.90	26.5	—	372	
<i>Hilli</i>	16,740	13.9	14	3	2	16	11	7	.37	1.52	21.2	—	402	
<i>Elephant (Jamaica)</i> ..	9,000	7.5	12	9	2	12	9	17	.69	2.44	18.3	—	427	
<i>Barbados Native</i>	12,900	10.7	11	12	3	0	8	12	.52	1.42	16.0	—	—	

TABLE II.—*Results of the Grinding of the Canes.*

Name of variety.	Imperial gallons of juice per acre.	Density of juice ° Beaume.	Percentage of juice yielded by mills.	Lbs. of sucrose per Imperial gallon of juice.	Lbs. of sucrose in juice per acre.	Decrease in juice per acre upon the Bourbon.	Decrease in sucrose in juice per acre upon the Bourbon.
		Degrees.				Gallons.	lbs.
<i>Bourbon</i>	4,185	10.	67.2	1.927	8,064	...	...
<i>Mauritius</i>	3,952	10.5	58.4	1.854	7,326	233	738
<i>Ribbon</i>	2,325	11.5	59.1	2.305	5,359	1,860	2,705
<i>Keni-Keni</i>	2,557	11.	58.6	1.977	5,057	1,628	3,007
<i>Naga</i>	2,327	11.	49.2	2.094	4,868	1,858	3,196
<i>White Transparent</i>	2,092	12.	53.3	2.326	4,866	2,093	3,198
<i>Elephant (Barbados)</i>	2,790	10.5	48.2	1.703	4,751	1,395	3,313
<i>Norman</i>	2,557	10.	56.2	1.849	4,727	1,628	3,337
<i>Sacuri</i>	1,860	11.5	58.6	2.154	4,006	2,325	4,058
<i>Purple Transparent</i>	1,627	11.2	52.3	2.266	3,686	2,558	4,378
<i>Salangore</i>	1,860	11.	52.5	1.979	3,681	2,325	4,383
<i>Mamuri</i>	1,627	11.5	50.8	2.248	3,657	2,558	4,407
<i>Batramic</i>	1,627	11.	43.9	2.211	3,597	2,558	4,467
<i>Demerara (?)</i>	1,627	11.	54.1	2.130	3,465	2,558	4,599
<i>Bouronappa</i>	1,395	11.2	47.4	2.219	3,095	2,790	5,069
<i>Hilli</i>	1,162	11.	49.3	2.081	2,418	3,023	5,546
<i>Elephant (Jamaica)</i>	930	11.	45.5	1.977	1,838	3,255	6,226
<i>Barbados Native</i>	697	11.	39.1	2.125	1,481	3,488	6,583

THE RELATIVE POSITION OF BEET AND CANE SUGAR.

OPINIONS OF MR. GÖRZ AND MR. G. DUREAU.

Mr. Jos. Görz, the eminent Berlin engineer and specialist, in discussing the question of how many and what sugar producing countries have accepted the invitation to the Congress, after stating that France can scarcely be expected to join the discussion, and that the other countries interested can probably arrive at some arrangement in their mutual interest without her, makes the following interesting remarks:—

“The most remarkable feature in the relative positions of beet root and cane sugars is that twice as much sugar is produced in the cane, as is obtained from it in a form capable of being brought into immediate consumption. Inasmuch as the quantity of sugar which is brought into the world's market is divided into two nearly equal portions, represented by cane and beet sugar respectively, it may be said that beet sugar forms as it were the complement of that portion of cane sugar which is lost in the manipulation of the cane. Reversing the position, the remark is no longer applicable, as by far the greater part of the sugar contained in the beet is obtained in the form of an article fitted for immediate consumption. This fact plainly involves a danger to the beet-root sugar, respecting which we shall have to come to some clear idea. If we further look at what has taken place in the past year in the world's market, we find a tolerably large amount of over-production, in consequence of which prices rapidly sank to a level which keeps only a little above the cost of production. This assertion is applicable as a whole to all sugar producing countries and colonies. The competition in the world's market is now extraordinarily great, this is carried on and still maintained by cane sugar against beet-root sugar, in spite of the fact that the former is still to a considerable extent hampered by export duties, &c., and although the latter appears in the world's markets under the support of more or less high premiums. In the face of this fact we are justified in asking, how would the beet sugar have stood the competition during the last few years, if on the one hand the export duties on cane sugar had been reduced, and on the other hand the premiums on the export of beet sugar had been abolished. This is a state of things which might very easily result from the projected congress, and therefore it seems very much in place to examine also this circumstance,

which comes straight before our eyes, in regard to its eventual dangers to the European beet root sugar production. Finally when we consider the changes in manufacture, partly in prospect and partly already being effected, we are met everywhere by the endeavour more and more to produce sugar in a consumable state in preference to raw sugar, which has become all the more easy, as the consumption of less perfectly refined sugar is rapidly increasing. But we find this endeavour not only in Europe, but also in the cane sugar districts, which up to no long time ago sent and also even to a great extent send the raw article to Europe and the United States and receive it back in the refined state, so far as it is required for consumption by the better classes. The endeavours of these cane sugar manufacturers are now directed towards freeing themselves from their dependence on the European refiners by producing a better article, so as to close the way for the imports from Europe. It is evident that the European refining industry will suffer from this action, but it will eventually be still more seriously injured, if it has to maintain the competition without the premiums, with which the task has already become difficult enough.

From the foregoing it appears, that it will not only be incumbent on those beet sugar-producing States, which are willing to send representatives to the Congress, to discuss the best manner of abolishing the premiums and settling on a permanent Convention with that object, but that the duty also devolves upon them most seriously to weigh the possible consequences to the beet sugar which may arise in its competition with the cane sugar, if, in contradistinction to its present position, it should enter into this competition in the world's market without any premium at all.

All the same, we cannot ignore the fact, that there are very weighty hindrances in the way of such a dangerous development of the cane sugar industry, as might, from the motives just adduced, seem to be very near at hand, hindrances which will be very difficult to overcome, and which cannot be got rid of at any very proximate date. These are universally known, and because they are so it is equally well known that their removal does not belong to the category of impossibilities; a too firm belief in this inevitability might one day be severely shaken, and to act on such a belief might bring fatal consequences to the beet sugar industry.

The sooner the system of premiums comes to an end, and the sooner the inequalities which it has caused through legislation and competition

give way to a uniform reform in taxation in the countries interested, the more quietly will the further development of the industry be able to pursue its course. But, before giving assent, we must examine carefully whether the advantage gained thereby outweighs the accompanying disadvantages, whether we are securing our own interests in the best manner, and have not come to a decision, the balance of which is heavily in favour of foreigners.

On this path of an examination in common of all the circumstances which speak for and against the acceptance of the English proposals, we should have been very willing to meet, for mutual collaboration, our French colleagues, who in relation to cane-sugar, have an equal interest with ourselves for we are just as little disposed as they are to deliver ourselves up blindly to those parties whose interests are not identical with our own. But we desire earnestly to examine the matter with a view and wish to bring the system of premiums to an end, if we find that we are not only acting for the advantage of others, but also of ourselves. It is therefore to be regretted that the manufacturers and some general councils have at once assumed so decided a position against the Congress, a position which is perhaps warranted by the present circumstances of the French industry, but which overlooks the fact, that the question of the contest between beet and cane-sugar, binds together the European sugar-producing districts in a common interest, and that the acceptance of the English invitation by no means includes a blind assent to the ideas and hopes with regard to the Congress which prevail in many English circles."

Mr. George Dureau, the well-known *redacteur* of the *Journal des Fabricants de Sucre*, writes as follows on the above subject:—

"Among the questions raised by the project of an international convention for the abolition of premiums, there is one which deserves to be very carefully studied by the producers of beetroot sugar. We refer to the competition of cane sugar. Speaking generally, beetroot sugar may be considered as the sugar which *par excellence* is favoured by premiums, whilst cane sugar is that which is produced under natural conditions, without other advantages than those with which nature has endowed it, which, we hasten to add, are considerable.*

In the present state of things, what is the object of the premiums granted to beetroot sugar? The premium enables the producer to sell below prime cost, and consequently, if we admit that the cost of pro-

* This is very true.

duction is equal for the two kinds of sugar, the producer of beet sugar will be able to sell with profit at a price which is ruinous for the producer of cane sugar. The more the system of premiums is exaggerated, the lower will prices fall, and the more reduced become the number of those who are placed under natural conditions, and who are selling at a loss.*

To what extent does the premium granted to beet sugar confer an advantage on it? Or, in other terms, if the premium were to be abolished, what would be the difference between the natural prime cost of beetroot and cane sugar? We see at once that this is a most interesting question. Whatever be the solution, there is one certain and indisputable fact, viz., that the abolition of the premiums granted to beetroot sugar would at once result in a general advance in prices, by which the producers of cane sugar would immediately profit.

The contest would then be carried on on conditions equal, as regards artificial advantages, but very different as regards natural advantages. In however small a degree certain colonies, as, for example, Cuba and Java, pursue their course on the path of improvement and progress on which they have entered, the equilibrium between beet and cane sugar would very soon be destroyed in favour of the latter. The question is exceedingly complex. It requires a profound study of the resources of the colonies, natural resources, fertility of the soil, the supply of labour, social conditions, facility of transport, of obtaining supplies, abundance of capital, &c. This study will probably have in store more than one surprise for those who may undertake it.

Does not an examination of the situation of the British colonies especially show that, according to the last statistics, their total export, which was, in 1864, the year of the "Convention of Drawbacks," 300,764 tons, attained in 1885 the figure of 505,000 tons—an increase of 68 per cent. in 21 years. And, as one of our English contemporaries has just remarked, it was during this period of 21 years that the beetroot sugar was enjoying those premiums, which are being denounced as ruinous to the colonies. During the eight months of the present year, have not the imports of raw cane sugar into the United Kingdom reached 325,000 tons, whilst those of raw beet sugar were only 253,650 tons?

In 1884-85, and even in 1885-86, during the two campaigns in which we in France have applied the system of taxing the raw

* A frank admission.

material, which is destined, according to the English, to consummate the ruin of the British planters, have not the imports of cane sugar into Great Britain reached more than the half of the total imports?

We lately read, in an English consular report on the state of the sugar industry in the island of Réunion, that on the plantations of the Credit Foncier they had been able to reduce the cost price of sugar from 46fr. 90c. (37s. 8d.) the 100 kilos., in 1878, to 34fr. 03c. (27s. 3d.) in 1886, and that by the aid of new improvements they hoped to be able, from the year 1887, to produce sugar at 31fr. (24s. 10d.), making a reduction of 34 per cent. in less than ten years!

A plantation in Réunion is instanced, on which, in 1886-87, the 100 kilos. of sugar have been produced at only 24fr. (19s. 3d.), and this estate reckons on being able still further to reduce the prime cost by adopting cultivation by implements, the plough, &c.; in a word, substituting mechanical for hand labour. The cost price of the cane, delivered at the mill, which in 1883 was 26fr. 94c. (21s. 8d.), was only 10fr. 65c. (8s. 6d.) in 1885. The cost of manufacture can be reduced by 5 to 6 francs. At the present yield of 9 per cent., the cost price of 100 kilos. of sugar can thus be reduced to less than 20fr. (16s.). Now, this yield of 9 per cent. is a very moderate one in proportion to the saccharine contents of the cane, and we have not heard all that can be said with regard to the improvement of the quality of the plant and the extraction of the juice. Under the conditions indicated above, a yield of 10 per cent. would bring down the cost price per 100 kilos. of sugar to 16 or 17 francs (12s. 10d. to 13s. 7½d.). Undoubtedly it is not every plantation that is in a position to realise this progress. But the mere fact that such progress belongs to the domain of possibility is surely somewhat disquieting.

We repeat, that the study of the question from this side deserves our full attention, and we recommend it particularly to the partisans of the International Convention, and especially to those whose excess of zeal is urging France to engage in an enterprise of which the consequences, which they do not seem to have foreseen, might be disastrous, not only to the sugar industry of this country, but also to its agriculture and its commerce; in a word, to the principal sources of its wealth.

GERMAN SUGAR COMPANIES,

Company.	Sales, &c.	Outlay and Expenses.	Gross Profits.	Written off.	Gratification, Interest, &c.	Cost of Beets.
	Marks.	Marks.	Marks.	Marks.	Marks.	Pfennig.
Duderstadt .....	.....	178,268	28,393	27,538	....	b 43½
Burgdorf .....	.....	.....	98,869	51,240	18,000	....
Schöppenstedt	2,052,397	1,883,313	.....	.....	..	....
Rastenburg .....	.....	.....	119,138	54,372	7,793	....
Nörten	2,385,113	2,340,083	45,030	Ɔ 58,520	....	....
Warburg .....	.....	.....	.....	47,775	....	66½
Tiegenhof	1,018,149	956,993	61,156	19,580	67,550	....
Oestrum .....	.....	.....	30,923	30,545	....	74
Hohenhamel .....	.....	.....	79,048	37,356	20,254	86
Frankenstein .....	.....	391,591	91,744	47,170	54,458	c 84¾
Brüx (Bohemia) ..	.....	.....	.....	.....	....	....
Predmeritz (do.) ..	.....	.....	.....	.....	....	....
Zduny .....	.....	.....	60,954	60,954	....	75½
Heilbronn .....	.....	.....	89,739	21,675	6,955	....
Unislaw	999,509	908,461	90,048	52,070	....	....
Eilenstedt	1,674,889	1,671,852	.....	.....	....	....
Magdeburg (Refinery)	.....	.....	298,589	115,300	18,328	....

a Of the debit balance of last year there still remains M. 108,873.

b The cost of working amounted to 71½ pf. additional.

c Including cost of working. Frankenstein is in Silesia.

CAMPAIGN 1886-1887.—(Continued from page 451.)

Company.	Net Profit.	Loss.	Carried forward or put to Reserve.	Dividend.	Capital.	
					Shares, &c.	Loan.
	Marks.	Marks.	Marks.		Marks.	Marks.
Duderstadt.....	a 855	....	.....	....	.....	.....
Burgdorf	29,629	....	.....	....	.....	.....
Schöppenstedt ....	.....	....	.....	35%	399,000	.....
Rastenburg	56,972	....	.....	2½%	.....	.....
Nörten	5,564	....	.....	....	.....	.....
Warburg	e 125,308	....	.....	....	.....	.....
Tiegenhof .....	.....	26,245	.....	....	.....	.....
Oestrum	317	....	.....	....	.....	.....
Hohenhamel	21,438	....	.....	....	.....	.....
Frankenstein.....	9,884	....	.....	....	.....	.....
Brüx (Bohemia) ..	fl. 80,007	....	.....	....	.....	.....
Predmeritz (do.) ..	.....	....	.....	6%	.....	.....
Zduny .....	.....	....	.....	....	.....	.....
Heilbronn	61,109	....	.....	4%	.....	.....
Unislaw	37,978	....	3,797	5%	.....	.....
Eilenstedt	3,037	....	.....	....	.....	.....
Magdeburg (Refinery)	183,289	....	46,615	6% & 7%	.....	.....

d The amount written off is included in this.

e On the previous year's operations there was an actual loss of M. 21,627.

See *Sugar Cane*, 1886, p. 507.

SUGAR FROM SORGHUM, COST ONE CENT. PER LB.

In our last number, in incidentally alluding to sorghum, and to the prediction made some five years ago that the United States would in a very few years be able not only to supply her own sugar wants but would have a surplus of sorghum sugar to export, we stated that we scarcely hear anything of it now.

A valued correspondent has sent us the *Chicago Journal of Commerce* of May 25 of the present year, which contains the following letter from Dr. Collier, the sorghum enthusiast, who is still full of hope. The *Chicago Journal of Commerce* has a short leader on the Doctor's letter, from which we extract the following:—"A sugar plantation
"having \$500,000 capital, and handling the cane of 5,000 acres, can
"have all reasonable assurance of a product of \$500,000 annually, at
"least \$250,000 of which shall be net profit, and that after paying for
"all wear and tear, commissions for selling and making due allowances."

Readers of the *Sugar Cane* may remember that the same thing was said five years ago, and yet the total production of sugar in the United States to-day is considerably less, in proportion to the consumption, than it was then.

The Rio Grande (New Jersey) Sorghum Works, which were then in full swing, are now closed, the proprietors having lost all the money they put into them, although they were aided by the State to the extent of \$1 for every ton of sorghum from which sugar was actually made, and of one cent. per lb. for every pound of sugar produced, and further aided by a protective tariff equal to two cents per lb.

In accordance with my promise I send you a few of the facts which were ascertained at Fort Scott, Kansas, and elsewhere, last season, which, in my opinion, fully sustain the opinion recently expressed by you in the *Chicago Journal of Commerce* that "sugar in every way the equal of cane sugar can be produced from sorghum at the low cost of one cent. per pound;" and while the above statement will arouse incredulity, it is to be hoped that it will draw attention to the following facts sustaining, if they do not absolutely demonstrate, its truth:—

1. Cost of cultivation of the sorghum crop.

W. M. Richardson, a very intelligent farmer at Fort Scott, who superintended the cultivation of 275 acres of sorghum for the Parkinson Sugar Co., furnished me with each detail of expense in the ploughing, planting, cultivation, harvesting, and delivery of the crop to the mill. The detailed figures will be furnished any one who

questions the general statement as to cost given. The total cost for the ploughing, planting, and cultivation of the 275 acres was \$608, or \$2.21 per acre. Mr. Clinton Bozarth, Cedar Falls, Ia., found the cost for 85 acres was \$302.50, or \$3.56 per acre. T. W. Shumaker, of De Witt, Neb., estimates the cost for same at \$2 per acre.

2. Cost of harvesting and delivery of cane to the mill.

Mr. Richardson found the expense for stripping, cutting up and delivery of the cane by wagons to the mill at half-mile distance to be $47\frac{1}{2}$ cents per ton of cane, and estimating the topping in the field as equal to cost of stripping, the total cost of harvesting and delivering of topped and stripped cane at the mill was 59 cents per ton. Mr. Bozarth found the cost of harvesting and delivering of unstripped cane to be 37 cents per ton.

3. Cost of manufacture of crop into sugar and syrup.

I am unable to furnish the data as to cost of working up the crop at Fort Scott, but Manager Parkinson assured me that the cost need not to exceed \$1 per ton of cane.

Mr. Bozarth found the expense to be 73 cents per ton, estimating the wood fuel at \$3.50 per cord.

The necessary cost is obviously the same as for sugar cane, and John Dymond, a practical sugar planter, and Vice-President of the Louisiana Cane Growers' Association, estimates the cost of manufacture for a central factory working 1,000 tons of cane daily at 56 cents per ton.

4. The amount of seed per acre.

The crop of seed at Fort Scott was very heavy, but the means for securing it were so inadequate and wasteful that the yield could not be ascertained. It sold readily at 50 cents per bushel, and President Drake, of the Company, told me they could have readily sold 50,000 bushels more if they had had it to sell.

At Ottawa, in 1885, 7,000 bushels of seed were obtained from 250 acres, or 28 bushels per acre.

J. A. Field, of St. Louis, gives, as the average report from his correspondents in twenty-one different States, thirty bushels of sorghum seed per acre.

Sorghum seed is practically identical in composition with Indian corn, and may be substituted for corn for every purpose for which corn is used. At present sorghum seed sells for prices far in advance of corn, but this inequality in price cannot be expected to remain after its production is greatly increased.

It has been found well adapted to the production of glucose, yielding 2½ gallons to the bushel of seed, the refuse feed from the glucose factory selling at 6 cents per bushel. The cost of manufacture of glucose has been found to be 18 cents for the bushel of sorghum seed manufactured.

Mr. Shumaker, above quoted, found the cost for gathering and threshing the seeds at 8 cents per bushel. This appears to be an excessive estimate, and is based upon a small quantity. As the seed may be readily cured upon the field and threshed as oats, rye, or wheat, the expense in preparing the seed for market cannot probably reach the above estimate by Mr. Shumaker.

5. Yield of cane per acre.

At Fort Scott a field of 22 acres of sorghum gave 14 tons of cane per acre; another gave 18 tons per acre. Upon good land adapted to the cultivation of Indian corn, a crop of 15 tons of cane per acre could not be called unusual, and intelligent cultivation would secure it as an average with several varieties. An average of less than 10 tons per acre would show unfavourable climatic conditions or disregard of the conditions of successful cultivation.

If now we estimate the crop of cane at 10 tons per acre we shall find the average cost per acre from the foregoing statements to be as follows :—

Ploughing, planting, and cultivation	\$2·59
Harvesting, and delivering to mill	5·40
Manufacturing	7·60
Gathering and threshing seed	2·40
Total	\$17·99

Or \$1·80 for each ton of cane worked.

The cutting and delivering of sorghum cane to the mill at Fort Scott began September 17th and up to October 4th, when it was first used for the making of sugar, there had been delivered 1,294·11 tons of stripped and topped cane, or 1,782·52 tons of cane with leaves and tops on. The average analysis of the juice of this lot of cane, as given upon page 15, Bulletin 14, Department of Agriculture, was as follows :—

	Per cent.
Sucrose, or cane sugar	11·59
Glucose	2·97
Other solids	3·24
Coefficient of purity	65·10

The above is the average of 21 mill juices, only one analysis being excluded, since, as is stated in the bulletin, the juice was "from cane which had been cut three days," and, as the analysis shows, had by this been rendered worthless for the production of sugar.

The above analysis shows that in the above lot of cane there was present a total of 269,977 pounds of sugar, of which 65.1 per cent. was available, or 175,755 pounds.

It is greatly to be regretted that all this sugar was thrown away in experiments upon "diffusion and carbonatation" preliminary to the actual production of sugar, since after October 5th the effects of the killing frosts of September 28th and 29th were shown in the character of the juices analyzed, and the cane was found to a large extent practically worthless for the production of sugar, while the faulty methods employed in its "diffusion and carbonatation" absolutely destroyed the few remaining chances for success in the production of sugar or even decent syrup.

We must look elsewhere for those results in sugar from which to estimate what such a crop as that grown at Fort Scott would have produced in other hands. At Rio Grande, N. J., from cane which gave a mill juice of the following composition:—

	Per cent.
Sucrose or cane sugar	8.93
Total solids	12.99
Co-efficient of purity	68.75

and which therefore contained a total of 163 pounds of sugar, of which 112 pounds were theoretically available in each ton of cane, they actually secured 85 pounds of merchantable sugar and 10 gallons of molasses from each ton of cane. To have secured equally good results the Fort Scott cane should have yielded an average of 103 pounds of sugar and 14 gallons of molasses for each ton of cane; and while this result is far short of satisfactory, and will doubtless be soon surpassed, it is much easier to believe that within a few years 150 pounds of sugar and 10 to 12 gallons of molasses will be a common product from a ton of sorghum cane, than it was a few years since, for a greater portion of our people to believe that such results as are recorded above would ever be secured. Indeed, it was less than five years since Geo. B. Loring contemptuously expressed a desire "to see a pound of sorghum sugar." But it is to be remembered that the views of Mr. Loring concerning questions of science "met those of scientists at a very obtuse angle," as the *New York Tribune* happily phrased it, and

especially in his attitude towards this new sorghum sugar industry, "his entire course was unreasonable, obstructive, and apparently malevolent." It is to be hoped that his successor in office, who, with greater knowledge and therefore greater faith, has sought to carry forward the good work so well begun and advanced under Gen. Le Duc, may before many years witness his prediction fulfilled when we should "not only produce our own sugar supply, but export it."

But the ordinary, ignorant, and careless methods of cultivation have by no means given us the results from sorghum which greater care in the selection of seed, the preparation of the soil for planting, and the details of cultivation, harvesting and working up the crop, will give and have given.

While the above average analysis of a crop of about 200 acres surpasses far what has been thought possible even upon a field of only 10 acres (see *Bulletin*, No. 3, p. 44, Dept. of Agri.), better results may always be expected when even a fraction of the care shall be given to sorghum which has resulted in such wonderful changes in the beet root.

With careful, but not expensive cultivation of six leading varieties of sorghum, giving a period of three months for manufacture, I obtained an average of 19 tons of stripped and topped cane to the acre, and the mill juices averaged the following in composition:—

	Per cent.
Sucrose or cane sugar	13.56
Glucose	1.50
Other solids	3.61
Co-efficient of purity.....	72.63

The above analysis shows the presence of 244 pounds of sugar, of which 177 pounds were theoretically available in each ton of the above varieties of cane, or a total per acre of 4,636 pounds of sugar, of which 3,368 pounds were available per acre.

Such a result I believe we are fully justified in believing practically possible from sorghum, and to secure it only demands the careful observance of such knowledge as we already possess as to the methods of cultivation and manufacture of the crop.

As the result of the work last year at Fort Scott I was assured that they were ready to guarantee a product of 20 gallons of masse-cuite or melada for each ton of stripped and topped cane worked, and at Rio Grande, N. J., last year, even with much poorer cane than was

grown at Fort Scott, as the analyses show that three-sevenths of the weight of melada was obtained as merchantable sugar; and sixty-nine and seven-tenths of the total sucrose present in the melada was obtained as merchantable sugar.

We find then as the general results obtained at Fort Scott, an average cane which would have given if worked as at Rio Grande per ton :—

103 pounds sugar at $4\frac{1}{2}$ c.	\$4·64
14 gallons molasses at 30c.	4·20
3 bushels seed at 40c.	1·20
Total	<u>\$10·4</u>

Or if we suppose no better results could have been obtained than were secured from inferior cane at Rio Grande, we have per ton of cane :—

85 pounds of sugar at $4\frac{1}{2}$ c.	\$3·83
10 gallons molasses at 30c.	3·00
3 bushels seed at 40c.	1·20
Total	<u>\$8·03</u>

We have already seen that growing, harvesting, and manufacture amount to \$1·80 per ton of cane, and it will be seen that the seed alone, estimated at 10 cents per bushel less than it actually sold for, pays two-thirds the entire cost.

The blades stripped from the sorghum cane constitute about 15 per cent. of the weight of the plant, and as food are fully equal to the best hay.

At Fort Scott cane was delivered by farmers at \$2 per ton for the unstripped and untopped cane and at \$2·50 per ton for the stripped and untopped cane.

The average of a large number of determinations shows that 100 tons of cane with blades and tops on would furnish 84·6 tons of stripped cane with tops on, or 84·6 at \$2·50 equals \$211·50, and 100 at \$2 equals \$200, from which it would appear that the farmers received only \$11·50 for stripping 100 tons of cane, in addition to the fodder thus secured by them.

There remains for consideration the production of paper pulp from the exhausted cane. Each step in the process of sugar production has advanced the cane in the process of converting this exhausted cane into pulp.

By simple means, easily adapted to the working of any quantity, there has been produced specimens of pulp which have been pronounced next in quality to that from linen rags.

A mill working up 300 tons of sorghum cane daily would be able to produce about 15 tons of such pulp, worth \$50 per ton.

PETER COLLIER.

Washington, D. C., May 14, 1887.

PRODUCTION OF SUGAR IN MEXICO.

The Belgian *Bulletin du Musée Commercial* for the 13th August last, contains an article on the sugar of Mexico. It states that, as far as indigenous sugar is concerned, no real refined sugar is at present produced in any part of Mexico. The great mass of the product of that country is composed of a dark brown unpurified sugar, which is called *panela* or *panocha*, prepared in the most primitive fashion for home consumption. In the northern states, where this raw sugar is not manufactured, sugar is imported in large quantities from the United States, across the northern frontier, or through the Pacific ports, the inconvenience and expense of bringing the indigenous sugar from the southern states of Mexico being so great that it is cheaper to import.

FOREIGN TRADE OF BRITISH GUIANA.

The following particulars respecting the foreign trade of British Guiana are extracted from the report of the Comptroller of Customs for the year 1886, a copy of which was forwarded in a despatch, dated the 7th July last, from Mr. F. W. Collier, Acting Assistant Government Secretary at Georgetown, Demerara:—

The total value of the exports in 1886 are given as \$8,290,417, being a net increase over 1885 of \$273,198. The exports of sugar in 1886 were valued at \$6,997,156, as compared with \$6,647,256 in 1885, showing an increase of \$349,900. Molasses were also exported in 1886 to the value of \$267,663 as against \$165,792 in 1885, an increase of \$101,871. The figures for rum are \$737,264 in 1886, and \$992,366 in 1885, showing the large decrease of \$255,102.

BRITISH AND GERMAN TRADE IN BRAZIL.

The following information respecting German competition with British trade in Brazil is extracted from a report, dated the 11th July last, by Mr. C. W. Bennett, Her Majesty's Consul at Rio Grande do Sul, which appeared in No. 216 of the Foreign Office Annual Series of "Diplomatic and Consular Reports on Trade and Finance":—

Attention has lately been drawn to the great efforts made by the Germans to completely control the trade of this district (Rio Grande do Sul).

Through the courtesy of the Inspector of Customs, access has now been had to the official returns, and the results of careful analysis are not very gratifying to the well-wishers of British trade.

The British imports passing through the Rio Grande do Sul Custom House in 1886 amounted to £143,897, and German to £142,824; the values for the last six months of 1885 being £77,048 and £66,712, respectively. These values are not obtained from the invoices, but are "official" values established as a basis for collecting duties. They do not by any means represent the actual trade value, but are sufficiently accurate to deduce general conclusions from.

The principal items of British importations were as follows: Cotton goods, £65,000; woollens, £8,500; linens, £2,000; chemicals and drugs, £5,000; leather goods, £2,600; earthenware, £16,000; iron and steel, £5,000.

Germany imported cottons, £32,000; woollens, £38,000; linens, £4,500; alcoholic liquors, £7,000; iron and steel goods, £4,000.

£7,000 worth of cotton goods were received from France, and wines, &c., to the value of £10,000.

The United States imports consisted chiefly of flour, £32,000; no linen or woollen goods, and only £2,000 of cotton being entered on the returns.

Articles of various sorts to the value of £30,000 are described as foreign goods imported duty-paid from other Brazilian ports, but no indication is given of their country of origin. Manchester, therefore, alone holds her own in cottons, and although statistics previous to June, 1885, are not available, it seems very probable that, even in cottons, British productions are being gradually squeezed out.

Nor is this result to be greatly wondered at, seeing that there are

only three British importing houses in the town; and, with the exception of a very few good native and foreign houses of business, all the remainder are controlled by Germans. Germans live and thrive upon smaller profits, and, however little the business, there is always some one in the house who is being trained to carry it on when the principals retire—a good custom, which, so far as I have noticed, is rarely observed in British houses abroad. To this fact may be traced the decay of many old houses, and the short-lived commercial efforts of the separate units into which they usually split up.

Moreover, in the province of Rio Grande do Sul, a very large proportion of the purchasing class are Germans by nationality or descent, and when their tastes can be suited with German goods, it is only natural that the traders should purchase from their own country rather than from the foreigner. The bulk of the British imports may therefore be considered as goods which cannot yet be produced in Germany, and exported thence so cheaply as from England.

There is no doubt but that the feeling widely prevails that what is of British manufacture is good, but the selling power primarily lies in cheapness; and a fraudulent trade mark, a familiarly coloured box, or a well-known label, will generally induce the purchaser to believe that he is buying for less money the serviceable article which answered his purpose so well before. The purchaser gains knowledge by experience, the sellers by customers' complaints and reduced sales; and it is satisfactory, at any rate, to know that, after prolonged trial, one wholesale dealer in boots and shoes has given up importing German wares, and again ordered largely from England.

The question of supplying inferior goods to compete with German, deserves careful attention, but the risk of making a present profit at the expense of a loss of reputation for good workmanship—which may easily affect more persons than the actual manufacturer—should never be lost sight of, especially as a revival of trade generally would probably first be felt by those who had consistently in evil days produced the best work.

Unless it be in chemicals and drugs, and in earthenware, it is absurd to suppose that Great Britain enjoys the supremacy in any single article imported into this province.

THE UNITED STATES' SUGAR TRADE SINCE 1789.

“A report on the (American) import and export movement in sugar, since 1789,” says Bradstreet’s, “published by the Bureau of Statistics, shows that the value of the imports has ranged from 4·18 per cent. of the value of dutiable imports in 1825 to 19 per cent. in 1885. The duty collected has varied from 4·76 per cent. of all customs duties in 1825 to 28·6 per cent. in 1885. In 1886 27 per cent. of all customs collected was levied on sugar and molasses, while these articles comprised only 13 per cent. of all merchandise imports and 20 per cent. of all dutiable imports. Sugar and molasses imports are our leading revenue producers. Wool imports are next, paying 14 per cent. of all duties collected. The highest annual average foreign cost of sugar was in 1836, when it was 6·17c. per lb.; the lowest was in 1885, 2·7c. per lb. Foreign prices of sugar have been tending downwards since 1881, owing to increased production. Foreign bounties have also been an important depressing feature. In 1860 this country produced one-fourth of the total home consumption, but in 1886 only one-tenth. The United States consumed 1,339,000 tons in 1886. The consumption, *per capita*, in Great Britain is 74·1lbs., in the United States 53·3lbs., in Switzerland 31·3lbs., in France 24·5lbs., and in Germany 17lbs. per annum.”

LOUISIANA.

EVAN HALL SUGAR HOUSE.

Mr. Henry McCall, the enterprising proprietor of Evan Hall Plantation, has kindly placed at our disposal the record of his sugar house for the past season. This record was kept by Mr. Levin A. Bechnel, chemist and machinist, who has used every precaution to insure accuracy. It is only deserved praise to say that Mr. McCall is one of our most intelligent and progressive planters, and his sugar house one of the best in the State.

This record, condensed, is presented in order to show the losses which are sustained even in our best sugar houses, and with the hope that proper appliances will be secured to avoid much of them in the future. It is learned that Mr. McCall has procured for the next season filter presses, whereby the losses in scums will be greatly

reduced. It is hoped that similar records will be kept next year, so that by comparison the actual gains may be ascertained.

Condensed Record of Evan Hall Sugar House, 1886.

No. acres cane ground	937	
„ tons „ „	22,368	
Average per centage of extraction ..	75.85	
No. gallons juice extracted	3,846,000	
„ pounds juice extracted	33,933,564	
„ „ total solids in juice	4,830,265	
„ „ sugar in juice.....	3,614,700	
„ „ total solids in syrup	4,103,632	
„ „ sugar in syrup	3,121,719	
„ „ total solids removed in scums.....	726,633	
„ „ sugar removed in scums..	492,981	
„ „ masse cuite obtained	4,837,049	
„ „ solids not sugar in masse cuite	981,913=20.30 %	} Per cent. compo- sition of masse cuite.
„ „ sugar in masse cuite	3,121,719=64.54 %	
„ „ water in „ „	33,4177=15.16 %	
„ „ 1st sugars obtained	2,440,678=50.40 %	of masse cuite.
„ „ 2nd „ „	47,766	
„ „ all „ „	2,488,444=51.4 %	of 1st masse cuite.
„ „ molasses from first masses cuite	2,348,605	
„ „ water evaporated from 1st molasses.....	436,949	
„ „ water left in molasses ob- tained	296,468=15.5 %	} Per cent. compo- sition of molasses obtained.
„ „ sugar „ „	633,275=33.1 %	
„ „ solids not sugar left	981,913=51.4 %	
„ „ Molasses obtained	1,911,656	
Per cent. of sugar obtained of total sugar in juice	68.84 per cent.	
Per cent. of sugar in molasses of total sugar in juice	17.52 per cent.	
Per cent. of sugar lost in scums, &c.	13.64 per cent.	

100.00

—Louisiana Sugar Experiment Station, Bulletin No. 10.

CUBA SUGAR MARKET.

(Expressly for the *Sugar Cane*.)

Havana, August 20th, 1887.

As usual at this period of the year, the sugar market rules exceedingly dull. A lot or two may change hands during the week, making it difficult to give accurate quotations for the different grades. Stock, in first and second hands through the island sugar warehouses, may reach the figure of 800,000 bags, and 20,000 boxes, which is gradually being shipped, mainly per steamers. May venture quoting "clayed" in boxes No. 12, D.S., at 6 rls. per @, or \$3 36 per cwt., and clarified or vacuum pan centrifugals, No. 11, D.S., poll: 96°, at $5\frac{3}{4}$ rs. per @, or \$3 22 per cwt.

THE CLOSED CROP OF 1887.

A reliable statement has been published with details of the year's sugar and molasses crop, which shows of a decrease amounting to some 65,000 tons sugar, compared with the previous year of 1886, equivalent to from 9 to 10 per cent. against the present year. The crop has amounted to 630,000 tons of 2,240 lbs.

OUTLOOK FOR THE COMING CROP, 1887-88.

At this time of the year it is rather early to give an accurate opinion or idea on the approaching crop, but, judging from present appearances, a decrease of 20 per cent. is predicted. A large area of cane fields is consigned to abandonment. Planters have at present little or no funds for properly attending cultivation, and the actual condition of affairs will be severely felt when grinding season is reached. The smallest crop made by Cuba during the last 17 years amounted to 485,000 tons of sugar, and it is hardly believed, at present, that she may overdo said figure next year.

Colonists, under the central plantation sugar factory system, are doing slow work. The unprofitable results obtained for the last two years offers them no encouragement. The abolition of the export duties on sugars has been received coldly. It is a medicine that amounts to little under the circumstances. Hopes are still entertained of a reduction in the United States sugar tariff, on next sitting of Congress. Also something beneficial is expected from the sitting of the International Anti-Bounty Congress, called to reach at an understanding in London.

SUGAR AND MOLASSES CROP OF THE ISLAND OF
CUBA, JUNE 30TH, 1887.

PORTS.	SUGAR.			MOLASSES.
	Boxes. 410lbs. N.	Bags. 310lbs. N.	Hhds. 1,500lbs. N.	Hhds.
Havana	21,000	455,500	11,000	26,650
Matanzas	150	438,500	16,500	45,000
Cardenas.. . . .	400	163,000	72,000	77,400
Sagua .. . . .	....	167,500	56,600	22,100
Caibarien .. . . .	....	88,900	6,700	1,750
Nuevitas .. . . .	....	50,000	....	500
Gibara .. . . .	....	36,000	1,450	1,000
Guantanamo .. . . .	....	151,000	1,400	....
St. Iago de Cuba .. . . .	....	59,500	100	....
Manzanillo.. . . .	....	42,370	....	2,320
Tunas de Zaza .. . . .	....	3,500	....	....
Casilda (Trinidad) .. . . .	....	4,400	7,900	2,500
Cienfuegos .. . . .	....	307,500	28,950	8,600
Total exported	21,550	1,967,670	202,600	187,820
Less Stock at warehouses, January 1st of the pre- vious crop	17,000	70,000	2,000	....
Total exported 1887 crop	4,550	1,897,670	200,600	187,820
Stock this date, seaboard warehouses	31,500	1,120,000	55,000	2,900
Packages—Grand Total	36,050	3,017,670	255,600	190,720
Equal to Tons (2240lbs.)	6,599	417,624	171,160	119,200

Total tons sugar 595,383 (exported).

Local consumption.. . . . 35,000 (estimated).

Total crop, 1887 630,383 tons of 2240lbs., or

“ “ “ 666,829 “ 2000lbs.

Equivalent to a fall of $9\frac{1}{2}$ per cent. compared with the crop of 1886.
In molasses the fall is equivalent to $21\frac{1}{4}$ per cent.

DESTINATION.

	Boxes.	Bags.	Hhds.	Tons.
United States	1,500 ..	1,735,500 ..	191,300 .	388,300
United Kingdom ..	150 ..	36,000 ..	100 ..	5,300
Spain	25,900 ..	132,500 ..	7,300 ..	28,750
British Provinces, } N. A. .. .. }	.... ..	16,500 ..	1,500 ..	2,400
Sugar Total ..	<u>27,550</u>	<u>1,924,500</u>	<u>200,200</u>	<u>424,750</u>

	Hhds.	Tons.
United States	186,500	149,500
Other countries	887	709
Molasses Total.. ..	<u>187,387</u>	<u>150,209</u>

Said statement shows that the United States has taken 93·55 per cent. of the totals, Spain the 5 per cent., and all other countries 1·45 per cent.

The quantity of molasses mentioned above has all been exported. The amount taken by the rum stills cannot be estimated, as no reliable source for information can be had on the island at present.

The difference noticed in the totals of the above exportations and the destinations is accounted for by having taken the datas from different parties.

SUGAR CULTIVATION IN THE PUNJAB.

Sugar cane is cultivated in India pretty extensively. The varieties are numerous—from a thin reed, light red coloured and sapless, about as thick as a man's finger, and 5 feet high, to a coloured but juicy and succulent cane, as thick as a man's arm, and 10 feet high. The common kind, cultivated in the neighbourhood of Bhot, near Sialkot, in the Punjab, is a green, or pale yellow kind, of medium size.

Imam Din, or Imam-ud-din, Zemindar and malee, who supplies vegetables to the *Sahib log*, and who cultivates sugar cane also, has furnished me with certain details connected with the cultivation of sugar cane. Here they are:—

“Sugar canes of last season's growth,” said he, “are put in plots of ground and allowed to remain there until the bud germinates.” To illustrate his meaning he took up a piece of cane, and after removing the decayed outer leaves, pointed out the buds at intervals

along the cane; a bud at each knot. "Two months is the time during which the bud is allowed to germinate thoroughly, before being transplanted. The cane is then dug up and cut in lengths of about half a foot each; two knots with their buds sprouting from them are usually a set. Actually, out of each set two distinct canes are grown. These sets are put into prepared soil, a little earth is scraped over them, and there they remain for nine months. The cane is then ready for cutting."

A good deal of the sugar cane, when partly grown, is cut in its green state, and is used for feeding cattle. Government use a lot of it for feeding their elephants, and its cultivation in districts where Government elephants are kept is a fruitful source of profit for the cultivator, who no doubt gets a better price for it in this manner—even with the contractor as an intermediate agent—than he would derive from it under the ordinary gur-making process. Yet the major portion of sugar cane grown in India is devoted to the making of *gur*, or unrefined sugar, and is used in its raw state as an article of food by the natives.

The following is the process by which the cane is converted into *gur*. The cane is cut down with a kind of chopper; then taken to the nearest *babri*, or crushing mill, for the purpose of having the juice extracted. There are several kinds of *baleri*. One a kind of wooden beam with an ironshod boot; this boot moves in an iron socket, and is drawn round by a pair of bullocks. The canes are put into the socket, are pressed by the boot, and the juice thus extracted runs out of a bamboo pipe into earthenware vessels.

Another kind of mill is of two rollers placed perpendicular, and close to each other, worked by a pair of bullocks. The cane is passed between the rollers, and the juice thus crushed runs out into a trough below. These are the ordinary mills of the country, primitive arrangements that must give away to the improved machinery of modern times; but as yet many of the villagers of Bhut have not even heard of their being improved on, and these evidently answer their purpose well enough at present. Imam Din took me round to the hut where the juice of the cane was being boiled, and informed me that this work was performed by the *mehther* caste only. He admitted that he himself and his people—who are all good Mohammedans—will plant, reap, and take part in the squeezing out process, will even

eat the boiled *gur* that is made from the sugar cane juice ; but boil it, never ! That's the *mehter log ki kam*, and to them it is life.

In the hut I found an old *mehtrani* sitting over a large pan or *kurrah*, busily removing with a ladle the scum as it rose on the boiling juice. This she puts into a *gurrah*, and this scum is, I believe, the peculiar *hug*, or perquisite of the sugar boilers. Imam-Din, good Mussulman that he is, could never think of eating this. Seeing it as it stood there in the *gurrahs*, a filthy mass, there is good reason, one would think, besides caste prejudices, to excuse Imam-Din and his people from indulgence. While the old woman is employed removing the scum, one of her caste *bhais* is busy feeding, with dried sugar cane pith and leaves, the *chula*, or fireplace, over which the *kurrah* is set to boil. Each *kurrah*, in Imam-Din's sugar-boiling hut, would hold about 12 to 14 gallons of juice, and the usual outturn of *gur* from one of them is two maunds per diem.

Much of the sugar cane in its uncrushed state is eaten by the natives. The casual observer will notice large heaps of sugar cane for sale in the bazaars. On enquiry he will find that it is sold from one pice for two small canes, to one pice each for the larger sizes. He will also notice at certain stalls pieces of sugar cane denuded of bark, and cut into pieces about one inch in length. The whole sugar canes are for the ordinary native who, depending on his good teeth, strip and chew it, and his wind to suck out the juice after, is content with this kind. But for the *Baboo logue*, and Anglicised schoolboys with effeminate ideas and inferior teeth, to these and the toothless old men and women, is the ready cut sugar cane a boon.

Who that has lived any time in India that has not noticed—in the months of October and November, when the sugar cane is ripening—quantities of sugar cane pith heaped or scattered under favourite halt trees at serais, in railway station platforms, or any of the many places where natives do congregate, and where the excellent sugar cane has helped to sweeten their converse.

Sugar cane juice is capable of being converted into several kinds of useful articles, such as vinegar, syrups, sugar candy, and loaf sugar, and last, though not least, a kind of arrack which Imam Din knows how to make, and of the making of which I am promised the details some day. I may then, perhaps, be able to let you know the secret.—“J. J.” in *C. and M. Gazette*.

Correspondence.

SUGAR BOUNTIES QUESTION.

TO THE EDITOR OF "THE SUGAR CANE."

Sir,—Sir Thomas Farrer has admitted that the bounties given to beet sugar by Germany, France, Austria, &c., are a disturbing factor to the cane sugar industry. This admission is confirmed by the following extract from a speech made by Mr. Thomas Bayley Potter, M.P., when he presided at the annual meeting of the Cobden Club, on the 30th July last:—"These bounties," he said "are as unjust to foreign nations, as they are inimical to the interests of their own people. But, unfortunately, the protected industries have grown so enormously, being fed by these bounties, that the respective Governments dare not touch them, and are forced to bolster up the inflated industry which they have created. It is difficult for our Government to press foreign nations beyond a certain point, and if foreign nations choose to make a positive gift of some millions a year to our consumers, it is not politic to urge the matter to a bitter end."

Why not? we, who are sufferers by the bounties, may well ask. Mr. T. B. Potter allows that the bounties have produced an "inflated industry," but such an industry, produced by *artificial means*, is directly contrary to the principles of Free Trade, and, consequently, any advantage that the English consumer may derive from it is a gain, the result of wrong-doing.

Now undoubtedly the object of the advocates of Free Trade is to get rid of what is wrong, and to uphold what is right. No temporary advantage to the consumer, for it will be only temporary, can possibly be a right plea for a breach of principle. Nay, further, no permanent advantage would justify a departure from right principle. Besides, the plea for the consumer falls to the ground, seeing that the advocates of Free Trade would to-morrow be glad to hear that these foreign bounties had by arrangement been abolished. Such abolition, however, would simply have the same effect as a countervailing duty. Then why object to such a duty? as it would destroy that "disturbing factor" which has produced that "inflated industry," which is so rapidly bringing to ruin the cane sugar British producing colonies and the British refiners? Again, the principles of Free Trade are not

selfish principles. The Free Trader does not surely wish the British consumer to benefit by the injury of the foreign consumer. The great object of Free Trade is to bring about a feeling of universal brotherhood, and so minimize the danger of cruel and destructive wars. But Mr. Potter tells us the bounties "are inimical to the interests of the people whose Government has adopted them." By permitting them to exist, how can we act the part of a brother to the foreign consumer, seeing that he has to pay a higher price for his sugar, and, moreover, has to make good the loss sustained by the revenue owing to their existence? Again, the foreign colonies are crying out against the unjust competition to which they are subjected; so that, all round, the British colonists and refiners, and the foreign colonists, are suffering in order that the British consumer may have his sugar one farthing per pound cheaper.

But let us look to the end. At the present price of sugar, the production of cane sugar cannot be maintained. At first the falling off may be small, for all will make a fight to maintain their position, but gradually the weak will go to the wall, and they that hold their own will become "small by degrees and beautifully less." And what then? Where will be the cargoes of sugar to fill our ships from our own colonies and from foreign countries, Brazil, Java, &c. They, as well as we, are all in the same boat. The ships wanting cargoes, the British consumer will be wanting cane sugar, by reason of the high price of the beet product. In conclusion, I know it is said that those engaged in the cane sugar industry might, if they adopted better mills and made use of chemical knowledge, easily hold their own against the beet sugar growers. How comes it then, that the British refiners, who doubtless have made use of the best appliances, both mechanical, and chemical, are falling one by one before their beet competitors? It is unjust, too, to charge the British colonists with the want of enterprise and skill in the manufacture of their produce. Who, I may ask, when a duty was levied on their sugar, so adjusted it, by a differential scale, that the colonists had no inducement to adopt improved methods in the manipulation of their products? It was the British Government that so acted, and, in spite of such action, improvements were made, especially in British Guiana; but what was the result? The British refiners complained of the introduction of the improved sugar, and, in consequence of their influence, instead of three differential duties, as to quality, a fourth

was introduced to the disadvantage of the improved product. Since the entire abolition of the duty on sugar, improvements have been made, and in Barbados, where now, alas, nearly one-fourth of the estates are in Chancery, there are ten, if not more estates, with steam machinery to one, twenty-five years ago. Finally, I would remind your readers that the duty on rum is 10s. 4d. per gallon, whereas the duty on British spirits is only 10s. The lame excuse is that the British distiller is put to disadvantage by reason of the excise laws. One would suppose there were no excise laws in our colonies. The freight and other charges on rum are a sufficient protection to the British distiller, without the aid of the excise laws abroad. But mark the inconsistency of the British Government. It subjects the Colonial distiller to an extra duty on his rum in order to place the British distiller on an equal footing, and yet it refuses the Colonial producer of sugar a like protection, as against the producer of subsidized beet sugar.

What the colonists require, nay what they demand, is, not any favour, but that their products should be allowed to compete with the beet product on equal terms in the home market. Let that equality be arranged either, by treaty with foreign countries, or, if that fail, by a countervailing duty on *all sugar imported by the way of the continent*, and then every colonist will recline "under his own vine, or under his own fig-tree, no man making him afraid."

Your obedient servant,

W. H. JONES,

Late Member of the Legislative Council of Barbados.

Athnowen, Red Hill, Surrey,

13th September, 1887.

P.S.—The proposed countervailing duty being levied on all sugar, coming by the way of the Continent, would supersede the necessity of inquiring what sugar had been subsidized, and what not, and being levied equally on the product of all countries the most favoured nation clause would not be affected by it. The extra price paid by the British consumer for his sugar, by reason of the duty, might, in some measure, be recouped by him, if the British Government would abolish the duty on tea, coffee, and cocoa.

GIBBS AND BARRY'S TEA-DRYING CYLINDERS.

Mr. J. Berry-White, who has seven or eight of these cylinders in use on his estates, writes that after some years' experience of their working, he is satisfied that they have proved more economical than any other appliance for drying tea that has as yet been introduced. He cannot give details as to the savings effected, as it would be only misleading to compare the cost of production on one estate using these cylinders against the cost of production upon another estate using a different drying apparatus, without, at the same time, showing the conditions under which the estates in question are worked; but the broad fact remains, *that tea is produced at a lower cost at those factories using the Gibbs and Barry machine than elsewhere in India.*

This does not apply to Mr. Berry-White's gardens only, but to all the neighbouring estates in Upper Assam, and he believes that this statement is equally true as regards Cachar.

Economy is effected by the smaller consumption of fuel, and less labour required to work the cylinder than any other machine turning out a similar large quantity of tea. The simplicity of its mechanism, and consequent non-liability to get out of order, also tends to this end.

The fear that the exposure of tea in course of manufacture to the direct influences of the combustion of coke would prejudicially affect its flavour has been proved to be utterly unfounded; some of the highest-priced teas sold during the last four years in Mincing Lane—notably those from Panitola and Kellyden gardens—were dried in these cylinders.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., M.S.C.I., Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street, Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

12153. F. H. DANCHELL, London. *Improvements in filter presses.* 8th September, 1887.

11393. O. BOWEN and J. COBELDICK, London. *An improved deodorizing, decolorizing, and filtering medium.* 20th August, 1887.

GERMAN.

ABRIDGMENTS.

39279. E. HEFFTER, Alljauer, Silesia. *Improved process for clarifying saccharine juices with tannin.* 22nd June, 1886. To obtain a great flaked easily filtered deposit by the known process of clarifying saccharine juices with tannin, certain experimental conditions must, according to the inventor, be strictly observed. The juices from the concentration of the rob of an alkalinity of at least 0.05 are used. They are cooled down to from 25 to 40 degrees centigrade; tannin is added until the alkalinity is lowered to from 0.02 to 0.04, and the liquid with the precipitation is heated to from 80 to 95 degrees centigrade to complete the clarification.

38893. L. WULFF, Gadebrusch, Mecklenburg. *Improved crystallising process and apparatus, with lower inlet pipe.* 16th December, 1885. A vessel, which is at the lower part made narrower, and in the shape of a cone, is filled up with crystals already obtained for the purpose of urging crystallisation; the concentrated solution is admitted slowly at the lower part through the same. According to the statement of the patentee, it would be possible to maintain a regular "crystallisation in motion" without the concentrated warm solution rising up into the cold solution in the vessel, because the concentration of the latter sinks in consequence of the crystallisation of substance. The apparatus working with a lower inlet pipe is provided with rings for the deposition of crystals, stirring devices with a hollow shaft, or concentric chambers communicating together, and placed one above the other.

39045. W. LERCH, Kwasnei, Post Solnitz, Bohemia. *Apparatus for packing sugar cubes in card board.* 17th August, 1886. In using this apparatus the sliding boxes, on leaving the cutting machine filled with sugar cubes, are moved into the drawers of a table forming the apparatus. These drawers have a loose bottom. The card board is laid upside down over the openings in the top of the table and fixed and stretched by the aid of two frames, a box, having an opening on its under side, is placed over the card board, and the loose bottom of the above drawers is moved upwards with the sugar cubes it carries into the card board. The loose bottom moves on a header, which can be moved upwards by means of a pedal and chain. When this is done the box is taken away, and turned upside down along with the loose bottom, the card board is then taken away from the box by placing its opening at the bottom over a block. A cover is put on

the card board box thus formed, which is then ready to be sent away.

38756. H. IKEN, Stuttgart. *Improved sawing machine for cutting sugar loaves or ice into discs.* 9th September, 1886. The machine is designed to be used by households and tradesmen. The sugar loaf or the ice which is to be cut into discs is placed between two belts, which are raised by means of a pedal, so as to bring the sugar loaf in contact with the teeth of two circular saws, when a downward pressure is applied to the pedal.

39043. J. FISCHER, Vienna. *Improvements in apparatus for sieving and filtering.* 16th July, 1886. For the purpose of washing out the mud deposited in the filtering process there is under the filtering apparatus a wide sieving pipe, in which turns an Archimedean screw, having a hollow shaft through which the steam or water used in washing passes. To keep clean the filtering surfaces of the various filtering chambers or plates of the apparatus, sieve pipes, bent in form of a spiral, or bent in two contrary directions, instead of the rotative brush discs, are applied. The filtering liquid issues through the pipes, and is spread uniformly on the filtering surfaces, as if it came out of a watering rose.

39287. M. F. HEDDLE, D. C. GLEN, and D. STEWART, Glasgow, Scotland. *Improved process for filtering and discolouring saccharine solutions, syrups, and other liquids.* 8th September, 1886. The filtering material consists of silicious sinter diatomaceous earth, the organic constituents of which have been carbonised in retorts hermetically closed to prevent the air from entering. After the carbonizing process is complete, the air must be completely excluded as long as the silicious sinter is not well cooled. One part of carbonized sinter (called "Hedylglin") to two parts of sugar in syrup are required. The powder and the juice are mixed together by means of stirring appliances, and filtered in centrifugal filter presses or filtering sacks. The carbonized sinter is regenerated in the same way as bone black.

39573. A. SEYBERLICH, Riga, and A. TREMPEDACH, Milan. *Process for removing nitric acid from solutions of grape sugar.* 9th November, 1886. When for the purpose of transforming starch into sugar, nitric acid is used along with sulphuric acid, the readily soluble nitrate of lime formed in the neutralization with chalk, would pass into the molasses along with the almost insoluble sulphate of lime, and cause gradually, in the course of the manufacture, the formation of an unworkable remnant of molasses. To avoid this, the nitric acid

is destroyed before the neutralization by adding sulphurous acid, in consequence of which sulphuric acid is formed, so that there is only this acid to deal with. If, for the purpose of promoting crystallization, soda is added to the solution of grape sugar neutralized with chalk, a small quantity of sulphate of soda is indeed obtained, but it does not prejudice the full treatment of the molasses.

39134. H. OPPERMAN, Bernburg. *A process of cleaning sugar solutions or plant juice by means of hydrate of magnesia.* 4th October, 1885. In the juice of beetroots that has been obtained by diffusion, artificial carbonate of magnesia is distributed in such a quantity that the proportion of magnesia is 0.2 or 0.3 per cent. of the weight of the beetroots. The juice is heated to 90 degrees centigrade, and 0.3 to 0.5 per cent. of lime is added to it. The latter, in contact with carbonate of magnesium, becomes carbonate of calcium, and hydrate of magnesia is formed; these two bodies are easily filtered. The presence of carbonate of magnesium prevents the bad effects of lime on protein substances, inverted sugar, and cellular substance. In the specification many modifications of this process are given.

39580. L. MAY, Bisenz, Hungary. *Box or bucket-wheel drying apparatus for sugar strips.* 28th February, 1886. In the inside of the apparatus a bucket-wheel turning intermittently receives the goods to be dried. Heated air is introduced through a special opening, either by blowing or by aspiration. The sugar is introduced through another opening in one of the cells, which are successively brought to a short standstill before this opening. When the cell under consideration comes again before this opening, a new strip of moist sugar is introduced through it in the apparatus, and pushes out the dried one that had been previously put in.

39975. The firm of P. SCHWENGERS & SONS, Uerdinger, on the Rhine. *Improvements on Patent No. 38551, 30th March, 1886, for removing sugar from molasses and other saccharine juices.* 9th July, 1886. The raw sugar is washed in closed vessels provided with stirring apparatus, or in diffusion batteries with methylic alcohol for the purpose of removing the syrup.

39812. R. REIL, Quedlinburg, and G. V. BOTHMER, Baddeckenstedt. *Improvements in root-cutting machines.* 8th October, 1886. This machine has a conical disc, on the surface of which projections are cut in the form of rasps; by means of this disc the roots are sliced in a wedged-shaped form, and reduced to a fine pulp.

39923. B. NEUMANN, Buckholz, Saxony. *Improvements in machines for cutting rock, or sugar stick.* 20th October, 1886. The rock or sugar sticks are introduced at the top of a vertical box, with their ends resting on a roll. By aid of an eccentric rod, a horizontal knife is brought down on to the sticks, cutting the parts which rest between the bottom of the box and the roll.

40035. F. KRÖGER, Cologne. *Improved crytallising vessel for sugar candy.* 17th November, 1886. (Addition to Patent No. 25875 of March, 1883.) The thread frames mentioned in Patent No. 25875 are here replaced by a frame composed of bars provided with oblique slits for intertwining the crystal threads. On opening the valve a spindle breaks in pieces the crust of crystals accumulated at the bottom.

BELGIAN.

ABRIDGMENTS.

67404. H. HILLEBRAND, Brussels. *Improvements in knives for beetroot cutting machines.* 3rd January, 1885. The inventor claims as his invention double-edged knives for beetroot cutting machines, used in the manufacture of beetroot sugar, mounted, with corresponding feeders in such a way inside the machine that the knives may be adjusted at will, to regulate the thickness of the beetroot slices, by simply pushing the knives only, or the feeders with the knives, backwards or forwards.

67425. SELWIG & LANGE, Brussels. *Improved process and apparatus for purifying impure sugar and salts by means of a series of methodic and successive lixiviations in an indefinite quantity of cleansing liquid.* 6th January, 1885. This process of purifying sugar consists in eliminating as completely as possible the syrup which adheres to the sugar crystals, without altering the substance of the latter, except under certain special conditions when they undergo partial decomposition. The process consists in subjecting the sugar which is to be purified to a series of isolated washings in a pure sugar solution, either completely saturated or diluted with water or composed simply of water.

67561. M. M. ROTTEN, Brussels. *Improved process for manufacturing sugar.* 17th January, 1885. This invention relates: 1st, To a process for the production of sugar, consisting in treating the impure concentrated solutions of sugar with hydrate of strontium, while keeping them well and constantly stirred; 2nd, To the pro-

duction of dehydrated stronia, by treating oxide of strontium with vapour, or a jet of vapour of water.

67634. LEBAUDY FRÈRES, Brussels. *Improvements in the manufacture of sugar.* 23rd January, 1885. The process is as follows: The juice from the pulp or the diffusing apparatus is clarified and submitted to a first carbonatation with the usual amount of lime, the scum from the first process being still utilized as manure. For the second carbonatation, instead of adding a fresh quantity of lime to the clarified juice, sucrate of baryta is added, which is obtained by treating the drainings of the centrifugal machine from the first boiling with baryta, in such proportion that all the sugar from the latter is converted into sucrate. The sucrate thus obtained, retains in a pure state, almost all the sugar contained in syrup from the first boiling, and consequently enriches the syrup from the second carbonatation, while its cleansing power is similar to that of lime.

38842. EMIL DE BUOK, Brussels, Belgium. 24th August, 1886. A contrivance for filtering solutions containing sugar and other solutions. The new apparatus has the shape of a table and contains a filtering plate of cast iron, provided with conical holes in which conical bits of pipes filled up with small discs of felt are introduced. The influence of a downward pressure applied to the filtering plate, causes the sugar syrup under it to filter in the upward direction; part of the sediments contained in the syrup deposits itself at the bottom of the apparatus in a special pocket prior to passing through the filters. Under the table are also special cavities into which steam is admitted for the purpose of heating the juice.

38961. KARL SCHLIEMANN, Pintel. *Portable beet root washing machine.* 20th August, 1886. In this machine, a washing drum is provided with inside, curved vanes which take up the beet roots to let them fall in the water when they have reached the top, and cause them to roll on the bottom of the apparatus filled with water during a quarter of a revolution. In this apparatus the washing is produced not only by the dropping of the beet roots into the water, but also by their mutual contact at the bottom of the drum. The earthy matter which is deposited in the lower fixed trough, is carried away from it by special curved vanes on the outside of the drum and a special screw motion. The apparatus saves a lot of water and time as the cleaning of the trough is taking place along with the washing of the beet root. It can be made small enough to permit its being made

transportable and thereby the washing of the beet roots on the field itself is rendered possible.

AMERICAN.

ABRIDGMENTS.

364550. F. SCHEIBLER, Burtscheid, near Aix-la-Chapelle. *Moulding boiled sugar mass.* June 7th, 1887. A large frame is packed with a layer of boxes, as close together as possible, but having neither tops nor bottoms, then a layer of laths placed not quite touching each other, then another layer of bottomless and lidless boxes, and so on till full, the sugar is run into this, and the boxes afterwards separated.

365247. W. P. ELLIOTT, Shelbyville, Indiana, U.S.A. *Device for loosening and cutting sugar.* 21st June, 1887. This is a gimlet with a curved blade attached.

366505. R. G. PETERS, Manistee, Michigan. *Discharge mechanism for vacuum pans.* July 12, 1887. This invention relates to an improved discharge mechanism for vacuum pans, and it provides a simple and convenient means of positively discharging the precipitate. The apparatus comprises a leg, a chamber arranged below the discharge end thereof, a pump or its equivalent for maintaining a vacuum, and a carrier movable within said chamber, whereby to positively discharge the precipitate.

365616. J. A. LOMBAS, Louisiana, U.S.A. *Machine for manufacturing and bleaching sugar.* 28th June, 1887. The sugar is placed in a perforated cylinder, which, by a steam wheel, is caused to revolve on a horizontal axis, at enormous velocity, in a stationary casing. Steam is let in by the hollow axis and drives out the molasses.

365515. R. GOODSON, Missouri, U.S.A. *Evaporator.* 28th June, 1887. A circular pan, divided into six chambers by radial partitions, slowly revolves over a fire with annular flue. The fire is immediately below one compartment, the flue under the next four, and a vacant space under the sixth. As the pan revolves, each chamber is filled at the vacant place, passes over the fire, then over the hottest end of the flue, then over successively cooler parts till it reaches the part above the vacant spot, when the nearly evaporated juice is run off and fresh juice run in to begin the cycle afresh.

366830. L. F. HAUBTMAN, New Orleans. *Defecator for cane juice.* July 19th, 1887. The object of this invention is to provide a new and improved form of defecator, wherein the vessel and its connections shall

be so arranged that the scum will be automatically delivered from the main portion of the vessel to this end. The invention consists of a vessel provided with a double steam-coil that is arranged to receive steam from the centre, and to discharge said steam and the water of condensation from the outer ends of the coil ; it also comprises a novel arrangement for utilizing the waste steam from the mill engines.

367120. W. P. STALLCUP, Comanche, Texas. *Evaporator and furnace.* July 26th, 1887. This consists of an open pan with a furnace below, one end having a flue formed of removable plates, discharging the furnace gases beyond the other end. The whole is thus capable of being quickly taken down and re erected when required.

11451. S. VICKES, Liverpool. *Improvements in apparatus for making lump sugar.* September 9th, 1886. A conical centrifugal machine-basket running on a horizontal axis receives the *masse cuite*. The basket is fitted with movable division pieces, both vortically and radially ; the casing of the centrifugal machine is closed with a lateral hinged cover, provided with pipes for introducing hot or cold air, or steam, as required. A carriage is also provided with gripping apparatus for gripping the front and division pieces, and withdrawing these parts with the consolidated sugar, and carrying it to the cutting apparatus in which the sugar is placed when stripped from the plates and divisions. The cutting apparatus consists of two pairs of rotating cylinders, the first pair being placed at an angle with the other, and each pair having teeth, or cutting edges, parallel with their axis. A shoot carries the sugar from one pair of cylinders to the other, and reverses the course, so that lumps which went sidewise through the first pair, go endwise through the second.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

IMPORTS OF FOREIGN REFINED SUGAR, 1882-1886.

Statistics of Imports of Foreign Refined Sugar, compiled from the figures made up by the British Sugar Refiners' Committee.

Refined sugar does not come from any country except from those which grant bounties on export.

	1882.	1883.	1884.	1885.	1886.
	Tons.	Tons.	Tons.	Tons.	Tons.
France	67,092	72,180	52,296	30,972	49,800
Holland	39,420	50,460	66,336	69,624	59,232
Germany & Austria	17,532	29,304	35,184	45,780	91,488
Belgium	8,688	5,316	4,008	3,960	5,484
United States ...	2,340	6,240	52,176	136,512	71,184
Russia .....	....	....	....	10,504	40,944
Other Countries ..	3,228	732	1,452	144	108
	138,300	164,232	211,452	297,496	318,240

NOTE.—When a country that has granted a bounty withdraws it, the importation from that country ceases. When a country reduces the bounty, the importation from that country diminishes, and *vice versa*.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, September 15th, 1887.

FAIR REFINING.	96c/o CENTS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
Sep. 15, 1887.—4 $\frac{7}{8}$ c.	5 $\frac{1}{2}$ c.	6 5-16c.	5 $\frac{7}{8}$ c.	Jan. 1, 1887—102,279 tons.
Sep. 16, 1886.—4 $\frac{1}{2}$ c.	5 $\frac{1}{2}$ c.	6 6-1-16c.	5 $\frac{5}{8}$ 11-16c.	Jan. 1, 1886— 57,328 tons.
Sep. 17, 1885.—5 7-16c.	6 3-16c.	7c.	6 $\frac{1}{8}$ c.	Jan. 1, 1885— 89,186 tons.
Sep. 18, 1884.—4 $\frac{7}{8}$ c.	5 $\frac{5}{8}$ c.	6 9-16c.	6 1-16c.	Jan. 1, 1884— 60,900 tons.
Sep. 20, 1883.—6 9-16c.	7 9-16c.	8 $\frac{3}{4}$ 13-16c.	8 $\frac{3}{4}$ c.	Jan. 1, 1883— 50,297 tons.
Sep. 21, 1882.—7 5-16c.	8 $\frac{1}{4}$ c.	9 $\frac{1}{2}$ c.	9c.	Jan. 1, 1882— 43,927 tons.
Sep. 22, 1881.—7 15-16c.	8 $\frac{5}{8}$ c.	10c.	9 $\frac{1}{2}$ c.	Jan. 1, 1881— 66,999 tons.
Sep. 16, 1880.—7 $\frac{1}{2}$ c.	8 3-16c.	9 15-16-10c	9 $\frac{1}{2}$ — $\frac{3}{4}$ c.	Jan. 1, 1880— 63,558 tons.
Sep. 18, 1879.—6 13-16c.	7 7-16c.	8 $\frac{3}{4}$ c.	8 $\frac{1}{2}$ c.	Jan. 1, 1879— 50,773 tons.
Sep. 19, 1878.—7 $\frac{3}{8}$ c.	8 $\frac{1}{2}$ c.	9 $\frac{3}{4}$ — $\frac{1}{4}$ c.	9 $\frac{1}{8}$ — $\frac{1}{4}$ c.	Jan. 1, 1878— 48,230 tons.
Sep. 20, 1877.—8 $\frac{1}{8}$ c.	2 $\frac{1}{2}$ c.	10 $\frac{1}{8}$ c.	10 $\frac{1}{8}$ c.	Jan. 1, 1877— 25,885 tons.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO AUGUST 31ST, 1886 AND 1887.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1886.	1887.	1886.	1887.
	Cwts.	Cwts.	£	£
Germany	3,609,779	4,195,155	2,226,471	2,272,854
Holland	213,950	311,221	138,298	168,508
Belgium	460,923	537,162	293,691	283,636
France	17,631	29,460	10,754	17,483
British West Indies & Guiana	1,586,101	1,891,706	1,257,865	1,326,684
British East Indies	520,920	234,009	271,553	106,512
China and Hong Kong	48,257	312	28,005	201
Mauritius	227,529	95,540	147,473	51,860
Spanish West India Islands	14,779	162,198	11,150	100,390
Brazil	427,069	582,479	286,266	306,270
Java	3,621,206	2,634,550	2,672,022	1,709,526
Philippine Islands	281,066	272,825	154,944	123,365
Peru	355,997	265,125	261,303	161,945
Other Countries	467,130	361,763	337,394	204,578
Total of Raw Sugars ..	11,854,337	11,573,505	8,137,189	6,833,812
Molasses	—	—	77,320	77,132
Total Raw Sugars	—	—	8,215,509	6,910,944
REFINED SUGARS.				
Germany	1,149,760	1,760,997	970,138	1,343,388
Holland	765,036	948,879	670,653	733,850
Belgium	73,106	130,150	67,703	107,329
France	417,812	1,045,382	377,909	783,776
United States	930,382	760,211	819,208	607,939
Other Countries	821,360	55,377	672,319	39,745
Total of Refined	4,157,456	4,700,996	3,577,930	3,616,027

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	91,044	76,173	63,793	42,381
Belgium	35,071	27,341	25,207	16,537
France	34,863	25,107	26,316	15,577
Portugal, Azores, & Madeira	57,757	57,916	42,480	33,357
Italy	77,127	56,230	54,625	34,872
British North America	7,925	13,319	7,448	8,738
Other Countries	243,086	201,359	188,672	136,178
Total	546,873	457,445	408,541	287,640

SUGAR STATISTICS—GREAT BRITAIN.

TO SEPTEMBER 24TH, 1887 AND 1886. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1887.	1886.	1887.	1886.	1887.	1886.
London	62	.. 99	227	.. 237	213	.. 246
Liverpool ..	80	.. 97	195	.. 184	198	.. 184
Bristol	3	.. 5	44	.. 42	44	.. 39
Clyde	38	.. 50	169	.. 173	171	.. 156
	—	—	—	—	—	—
Total ..	183	251	635	636	626	625
	—	—	—	—	—	—
	Decrease.. 68		Decrease.. 1		Increase.. 1	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. TO AUGUST, 1887 AND 1886.

	STOCKS.		DELIVERIES.		IMPORTS.	
	September 1st.		In August.		In August.	
	1887.	1886.	1887.	1886.	1887.	1886.
New York	136	.. 133	70	.. 84	60	.. 71
Boston	15	.. 22	17	.. 18	14	.. 16
Philadelphia. . . .	2	.. 6	18	.. 10	14	.. 11
Baltimore . . . . .	..	..	..	..	..	..
	—	—	—	—	—	—
Total.	153	161	105	112	88	98
	—	—	—	—	—	—
	Decrease .. 8		Decrease .. 7		Decrease .. 10	
Total for the Year	—	—	827	779	878	882

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST AUGUST, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
200	123	33	32	21	16	425	553	671

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST AUGUST, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
1214	465	47	405	203	331	2665	2599	2457

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP,
OF THE THREE PREVIOUS CAMPAIGNS.

(From *Ticht's Monthly Circular*.)

	1887-88.	1886-87.	1885-86.	1884-85.
	Tons.	Tons.	Tons.	Tons.
France.....	550,000 ..	488,299 ..	298,407 ..	308,410
German Empire ..	1,000,000 ..	997,962 ..	838,131 ..	1,154,817
Austro-Hungary..	450,000 ..	523,061 ..	377,032 ..	527,766
Russia and Poland.	400,000 ..	475,000 ..	537,860 ..	386,433
Belgium	100,000 ..	91,120 ..	48,421 ..	88,463
Holland and other Countries	50,000 ..	50,000 ..	37,500 ..	50,000
Total.....	2,550,000	2,625,442	2,137,351	2,545,889

This estimate for 1887-88, as compared with that given last month, shows a reduction of 50,000 tons, viz., Russia and Poland 40,000 tons, and Belgium 10,000 tons, and a decrease, as compared with the campaign of 1886-87 (the heaviest on record), of 75,000 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The sugar market during September has been dull and weak, and values, especially of beet sugars, have receded. In cane-grown, the sales have been remarkably small.

The present price for German beet, 88% in all positions, is 11s. 10½d., and at this it has sold freely for consumption.

Mr. Licht has again reduced his estimate,—this time by 50,000 tons. The stocks in Cuba, as compared with a year ago, are some 40,000 tons less, and the prospects of the next crop point to a deficit of 100,000 tons; a number of estates there having been abandoned, on account of the ruinous low prices ruling. The supplies from other cane-growing countries are not expected to exceed, if they reach, those of the past year.

The imports of American refined in August were 1,787 tons, against 3,371 tons in July; and for the eight months, 38,007 tons, against 46,518 tons same period in 1886.

The deliveries in the United Kingdom up to 24th September show a decrease of 920 tons, and the imports an increase of 1,016 tons, as compared with the corresponding period of 1886.

The stocks in the United Kingdom on 24th September were 182,563 tons, against 251,316 tons in 1886, or a decrease of 68,753 tons.

Present quotations for the standard qualities, as under, are:—

FLOATING.		Last Month.
Porto Rico, fair to good Refining	12/- to 12/6 against	12/- to 12/6.
Cuba Centrifugals, 96% polarization	13/3 to 13/6 ,,	13/3 to 13/6.
Cuba Muscovados, fair to good Refining..	12/- to 12/6 ,,	12/- to 12/6.
Java, No. 14 to 15, good to strong	13/9 to 14/3 ,,	14/- to 14/3.
LANDED.		Last Month.
Madras Cane Jaggery.. .. .	9/- to 9/6 against	9/- to 9/6.
Manilla Cebu and Ilo Ilo	9/- to 9/6 ,,	9/- to 9/6.
<hr/>		
Paris Loaves, f.o.b.	15/3 to 15/6 ,,	15/4½ to 15/6.
Titlers	17/6 ,,	18/-
Tate's Cubes.. .. .	19/- ,,	19/6
Austrian-German Beetroot, 88% f.o.b. ..	11/10½ ,,	12/10½

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N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

A paper on Saccharin, by Dr. Constantin Fahlberg, read at the recent meeting in Manchester of the British Association, we give in the present number. See page 565.

At page 586 will be found some further correspondence between the British Sugar Refiners' Committee and the Foreign Office on the proposed International Conference on Sugar Bounties.

In answer to a deputation, on the 27th ult., Baron Henry de Worms stated that France had acceded to the request to join the conference; so that no obstacle now remained to prevent the summoning of the Powers immediately, and in all probability the meeting would take place during the present month.

A sort of trades' union has been established by the principal sugar refiners of the United States, in order to regulate their output by the demand, and thus keep prices up to a paying level. The result of such a combination will probably be, to strengthen the hands of those who are advocating a considerable reduction in, if not an entire abolition of, the duties on sugar.

The working-men's demonstration against all foreign bounties took place on the 3rd ult., in Hyde Park. There were about 6,000 persons present. Some of the London papers speak slightly of this event, but it will be found to greatly strengthen the hands of those who will

advocate, at the forthcoming International Sugar Congress, the total and immediate abolition of bounties. At page 591 we give a summary of the proceedings.

The Governor of Réunion, in a speech which he lately made, stated that, in his opinion, where the cultivation of the cane is carried on methodically, and on proper soils, the Colonist still makes a very tangible profit, though no longer the enormous returns of old times.

The *Bulletin des Halles*, in announcing an issue of 6% shares for a sugar refinery in Barcelona, remarks:—"The sugar industry in foreign countries is anything but prosperous, and we see all the establishments disappearing by degrees that attempt to contend against the fearful competition of our large French manufactories. We do not think, therefore, that capitalists will be in a hurry to respond."

At page 595 we give a translation of a remarkable letter, addressed to the *Journal des Fabricants de Sucre*, respecting the suppression of bounties in France, which, the writer declares, do not exist; and his statements are so loose and vague, and made in such a jerky, irregular style that it is scarcely possible to see any argument, and his final assertions are so *outré* that the editor appends a note. "Of course the editor of this journal leaves to the author the responsibility of the very paradoxical thesis which he advocates."

At pages 570 and 571, will be found a table showing the results of 35 German sugar companies, for the campaign 1886-87. Of this number five show losses, averaging £4,354; five others apply the profits in reduction of previous debit balances. In three others the average profit is below £8, and in five, under £200; eight companies show profits of M. 50,000 and upwards, and average £3,660. The most remarkable feature in this list is the result of the Culmsee Company, one of the largest in Germany; with a turnover of upwards of £200,000 the profit made is not £20.

For these particulars, which we have tabulated, we are indebted to the *Deutsche Zuckerindustrie*.

The *Jamaica Post* says:—"The erection of central factories in Jamaica for the manufacture of sugar seems to be the only thing that will ever raise this once great industry to what it formerly was. Much reliable information is needed on the subject, and we are glad to know that the Hon. W. B. Espeut will shortly deliver a lecture on it at the rooms of the Young Men's Christian Association. We need scarcely say the reputation of the lecturer, not to speak of the interest pertaining to the subject, will secure a large audience."

The Department of State at Washington has received a despatch, dated September 2, from the American consul at Demerara, stating that the sugar planters in that colony have abandoned the manufacture of crystals for the English market, and are turning their attention to the production of dark sugars for the United States. The Guiana planters cannot compete with the American refiners, but can produce raw sugars as cheaply as the planters of any other country. Last year British Guiana exported 124,253 hogsheads of sugar to England, and 47,523 to the United States. The estimated exports to the latter country this year are put at from 70,000 to 80,000 hogsheads. This increase of trade has resulted in the withdrawal of the steamers plying between Demerara and England, and of large ships engaged in the Calcutta trade from their regular routes, to carry sugar to the United States.

SORGHUM SUGAR.—The following appeared in a recent number of *The Sugar Bowl*, copied from *St. Louis Grocer*:—"Sorghum promises to worry the beet-sugar producers of Europe more than the talked-of abolition of the State bounties. Professor E. B. Cowgill, State Sugar Inspector of Kansas, says:—'Sorghum will enable Kansas to produce the sugar for the whole country.' Should Louisiana experiments score as big a success with cane sugar as has been made with sorghum, why shouldn't we do our own sweetening instead of remaining a supporter of foreign sugar producers?"

The Sugar Bowl gives a telegram, from Fort Scott, which has been sent to New Orleans, dated September 21st, from C. A. Crampton, Assistant Chemist, United States Department of Agriculture, which is as follows:—"We have just finished throwing out strike of 15,008 pounds (6 tons 14 cwts.) first class sugars from 132 tons sorghum,

polarising 92, and so certified by State Agent Cowgill. This is 113 pounds of sugar and 15 gallons of syrup per ton of cane. From the latter we shall probably get 20 pounds of sugar additional, as seconds, to a ton of cane, with 12 gallons of syrup. Indications are favourable for continuance of as great a yield."

The same paper tells us that a sample of the sugar has been sent to New Orleans to test its value, when a bid of six cents was at once made, which, it adds, "establishes its value beyond question."

In the October number of *Chamber's Journal* is a short paper with the heading "Why is sugar so low in price?" from which we extract the following paragraph:—

"Why is sugar so cheap? It is because certain continental nations virtually raise a heavy sum yearly and give it to their sugar refiners, (manufacturers) to enable them to undersell cane sugar-growers. This sum is estimated at £1,200,000 a year," (the writer has, strange to say, left France out in this calculation) "extracted from the pockets of foreign taxpayers, for our benefit, without counting that portion of the bounty which refiners (manufacturers) may be supposed to retain as profit, but which they will disgorge, if necessary, to undersell cane sugar-growers."

After speaking of the progress made in the cultivation of beet, it goes on to say "it must not be forgotten that all that beetroot has gained, cane sugar has lost. Sugar cane is not grown in the West India Islands without much expenditure of labour and capital, and only after great care in planting and draining. All this will be lost if cane sugar goes to the wall, and already sugar estates are falling out of cultivation."

We are glad to see this notice in such a widely-known household Journal as Chambers', for it will be read by thousands who take little or no interest in commercial questions.

Referring to the advertisement on page xvi., we wish to call the attention of the curious to the scarce "History of Barbados," by Lygon (No. 17). It is the *first* edition, and, what is not common, perfect in every respect.

SACCHARINE: THE NEW SWEET PRODUCT FROM COAL TAR.

Read before the British Association at Manchester, September 5th, 1887,

BY DR. CONSTANTIN FAHLBERG.

The subject which I am going to bring before you is one which may, perhaps, be known to many of you, at least, by name. In the first place, I think it well to give you a short history of this new and interesting compound, stating how I came to discover it, and what my principal work was during the period of nine years, in developing it for purposes of manufacture on a large scale.

When, in the year 1879, I became connected with the Johns Hopkins University of Baltimore, part of my work was to repeat the older experiments of Latchinow, Anna Wolkow, Remsen, Beckurts, and others, on the toluene sulphamides. I prepared first the toluenes sulphamides, in order to study their oxidation products; some of them, the "para" and "meta" compounds, had previously been studied by others, but the "ortho" compound had not been investigated up to that time.

By oxidising pure orthotoluene sulphamide, I found that it yields a remarkably sweet compound, but the amount obtained by the process employed was so small, that it was hopeless to think of making the laboratory experiment fit for a manufacturing process. Not discouraged by this fact, I set to work to study other reactions, in order to get a better yield of the sweet body.

In the first place, the costly anhydrous or fuming sulphuric acid was not fit for yielding sufficient orthotoluene sulphonic acid, it was found that by treating toluene with anhydrous sulphuric acid the parasulphonic acid was the principal product formed. Experimenting with different strengths of acids, it was found that sulphuric acid of 66° Baumé answered the purpose best at low temperature, converting almost one-half of the toluene into the orthosulphonic acid.

The next step in the process was the treatment with phosphorus pentachloride—a reaction which cannot be carried out on a large scale. I therefore experimented with phosphorus trichloride, employing a current of chlorine gas, and found by this method of treatment that the action was less violent and more under control, but it gave the same results as when phosphorus pentachloride was employed. In

order to manufacture phosphorus trichloride a new apparatus had to be devised, this compound not having been manufactured up to that time in sufficient quantities to warrant the hope of obtaining a continuous supply for my purpose.

The apparatus which I have devised for effecting this object is made of cast-iron, and the phosphorus used is the yellow and not the red modification; the apparatus being so constructed as to allow of continuous flow of phosphorus into it through a funnel. With this apparatus an unlimited quantity of the trichloride may be manufactured, the cost of production being comparatively small, whilst the purity of the article is very high.

In my laboratory work I made use of aqueous ammonia for transforming the orthosulphonic chloride into the amide, but I found that the water was very dangerous, changing the sulphonic chloride frequently back into the sulphonic acid, and not into the amide as desired, and so rendering this step of the process very uncertain. To avoid this inverse reaction, water had to be excluded, and dry ammonia gas had to be used, which again required complicated apparatus and study of the conditions under which the reaction progressed most favourably.

My apparatus as now constructed, and the knowledge which I have gained by patient study of this part of the reaction, have so overcome this inverse reaction as to make the yield almost a theoretical one.

The oxidation of toluene orthosulphamide into saccharine requires great precaution, and it was found necessary to change very materially the work at this stage of the process from the laboratory method to that necessary for a manufacturing operation. In my previous work I had stated that toluene sulphamide yields on oxidation with potassium permanganate two products—namely, saccharine and orthosulphobenzoic acid. At that time I had assumed the reaction to take place with elimination, not of ammonia, as a chemist would be inclined to suppose, but in that of nitrogen. Now I find that this reaction is an entirely different one; that neither ammonia nor nitrogen is formed, but that by oxidation, part of the amide group is changed into nitrates in the presence of potassium permanganate.

To check this formation, very dilute solutions have to be employed, and the subsequent evaporation becomes a very expensive operation.

A discovery which took place at this time helped me greatly to utilise the sulphobenzoic acid formed during the process, by trans-

forming it into saccharine. This discovery consisted in the following reaction:—If a neutral salt of sulphobenzoic acid be treated with phosphorus pentachloride or with trichloride in a current of chlorine gas, the bichloride formed in this reaction yields, on treatment with ammonia, not as might be assumed, a diamid, but an ammonium salt of saccharine, from which saccharine can be easily separated, like from any other salt of it, by the addition of a mineral acid. The parasulphonic chloride, which forms a bulky mass, in order to carry through the operations to separate the orthosulphonic chloride is now transformed in autoclaves under pressure, and by super heated steam into toluene and sulphuric and hydrochloric acids. The toluene is made use of again, and by this reaction almost all the substance started with is transformed finally into saccharine.

Works of such an extensive character as those at Salbke Westerhüsen, Germany, erected to supply the whole world with saccharine, require very large quantities of potassium permanganate and phosphorus, and to work economically it is necessary to utilise the manganese hydroxide obtained as a by-product for reconversion into permanganate. It may also be necessary to utilise the phosphate residues for making phosphorus later on, if this material continues to be sold at its present high price, but I hope that the existing phosphorus manufacturers will be able to supply me for some time to come.

From the above statements you can easily conclude that there was much work to be done to put me in the position in which I am at present, to supply the world with a sufficient quantity of saccharine.

My previous publications on saccharine, although of an entirely theoretical value, had not been accurate enough in their statements, so as to leave no doubt about the constitution of saccharine. Remsen, Maumené, and others, had speculated on various formulæ for this new body. The former had assumed the formula to be $C_6H_4 \begin{smallmatrix} COH \\ SO_2 \end{smallmatrix} N$; whereas Maumené had thought to find a similarity between saccharine and taurine, probably through his manipulative errors in the determination of sulphur.

For the formulæ of the salts of saccharine I had assumed the non-existence of the orthosulphaminebenzoic acid, and had thought the salts of saccharine corresponded to the formula belonging to sulphaminebenzoic acid. Later on the existence of orthosulphaminebenzoic acid was proved by Noyes, who had oxidised sulphamide with ferri-

cyanide of potassium in an alkaline solution. It now became of the utmost importance to decide between the two formulæ assumed by Remsen and myself; and taking into consideration the work published by Noyes, whether the existence of orthosulphaminebenzoic acid was true or not, and which of the two formulæ really belonged to saccharine—namely, $C_6H_4\langle\begin{smallmatrix} COH \\ SO_2 \end{smallmatrix}\rangle N$, or the formula suggested by me $C_6H_4\langle\begin{smallmatrix} CO \\ SO_2 \end{smallmatrix}\rangle NH$. I repeated the work of Noyes, and found that he was correct in all his statements. At present I have an investigation in progress, which will prove that the above orthosulphaminebenzoic acid of Noyes can also be made in a different way, and with a better yield, which reaction I will make known at a future time. The formulæ for the salts of saccharine, as assumed by me, were accordingly wrong in some respects, as it is impossible for two isomeric orthosulphaminebenzoic acids to exist. On re-examining my salts of saccharine I found them all to correspond to the formula, $C_6H_4\langle\begin{smallmatrix} CO \\ SO_2 \end{smallmatrix}\rangle NM$, in which the hydrogen atom of the imide group is replaced by monad metals, or monad-organic radicles. The ethers which in my first attempt I found impossible to prepare, I have finally succeeded in forming, and these were greatly instrumental in helping me to prove the constitution of saccharine and its salts, without any doubt whatever. If any of these ethers be enclosed in a sealed tube in the presence of hydrochloric acid, an alkylamine and sulphobenzoic acid are formed. I have proved, in one instance, the existence of ethylamine by the isonitrile reaction of Hofman and the formation of the double salt of platinum chloride. This transformation proves beyond any doubt the constitution assumed by me, as given above, for saccharine and its salts, as well as for its ethers.

According to the above facts we must look upon saccharine as an inner-anhydride or benzoylorthosulphonic imide, which yields salts and ethers entirely different from the orthosulphaminebenzoic acid; in fact I have succeeded in transforming one into the other, and *vice versa*.

If orthosulphaminebenzoic acid be heated, it changes into saccharine (*i.e.*, benzoylorthosulphonic imide) with the elimination of water; if, on the other hand, saccharine be subjected to a current of hydrochloric acid gas in the presence of alcohol, the ether of orthosulphaminebenzoic acid is formed, which also yields, on heating, saccharine, with the exception, that in this case, not water but alcohol is elimi-

nated. A further interesting reaction of the ether of saccharine, and not of orthosulphaminebenzoic acid is this, that it forms by saponification with an alcoholic solution of potash a double potassium salt of ethysulphaminebenzoic acid, having the formula— $\text{COOK}—\text{C}_6\text{H}_4—\text{SO}_2\text{N.KC}_2\text{H}_5$. If this compound be treated with hydrochloric acid, or any mineral acid, the potassium is eliminated, and an isomeric compound of the ether of orthosulphaminebenzoic acid is formed, which I have designated as ethysulphaminebenzoic acid, and which is isomeric with the above-stated ether of orthosulphaminebenzoic acid. I have an investigation in progress which will prove that these reactions hold good for all sulphimides; as, for instance, terephthalic and mesitylenic sulphimides, and other bodies of the same constitution.

Having mentioned the first difficulties which I met with, and having given you a short outline of the chemical side of the saccharine question (the material which has been of late so prominently before the public notice), I wish, at this stage of my paper, to call your attention to the uses of saccharine in the arts, in the household, and in medicine. I may say that there are at the present moment a number of manufacturers using saccharine already for the purposes of sweetening bread, cakes, champagne, lemonade, oils, essences, and medicines of all kinds. Its sweetening power being three hundred times greater than that of sugar, you can imagine that it will serve for many purposes to which sugar cannot be applied, such as disguising the unpleasant taste of medicines, and be used in flavouring the food of patients to whom the use of sugar would be injurious.

One very important fact must be here pointed out with respect to saccharine, and that is, its non-fermentable character, distinguishing it from the sweetening materials belonging to the carbohydrate class or sugar family proper; it is in no way altered by the action of yeasts or other ferments, in the way that the carbohydrates are degraded, in fact, it rather acts in such a way as to prevent fermentation, so that saccharine retains its sweetening property under all conditions for an indefinite time.

In addition to the high sweetening power of saccharine, it has also antiseptic properties, which will make it useful in preserving articles of food, as I have frequently seen suggested in the newspapers; it is nothing more than a condiment or spice, and should never be tasted in the pure state, because taken in too large a quantity it will act upon the nerves in such a way as to paralyse the sense of taste, just as powerful music stuns or deadens the auditory nerves, or a very bright light acts upon the optic nerves.

I may inform you that almond and other breads are now to be had sweetened with saccharine, as well as champagne similarly sweetened, for diabetic patients and those suffering from fatty degeneration.

GERMAN SUGAR COMPANIES,

Company.	Sales, &c.	Outlay and Expenses.	Gross Profits.	Written off.	Gratification, Interest, &c.	Cost of Beets.
	Marks.	Marks.	Marks.	Marks.	Marks.	Pfennig.
Malchin .....	.....	599,356	103,823	35,711	<i>a</i> 23,044	<i>n</i> 101
Ottmachau .....	.....	.....	21,002	28,753	<i>b</i> 8,837	....
Riesenburg .....	.....	.....	.....	17,571	....	....
Hornburg .....	.....	.....	.....	.....	....	....
Altenau	874,896	790,130	84,766	32,620	....	....
Markranstädt	1,015,018	941,355	73,663	19,618	....	....
Badersleben	1,186,072	1,027,326	158,846	26,317	....	....
Klützw .....	.....	718,571	155,980	<i>c</i> 151,528	....	<i>o</i> 75½
Alt-Jauer .....	.....	.....	.....	86,400	....	100
Zülz	644,391	530,965	115,484	<i>g</i> 104,118	....	....
Culmsee	4,270,239	4,039,530	230,709	230,323	....	<i>p</i> 79½
Göttingen	765,460	711,353	54,106	42,999	....	91½
Soest .....	.....	.....	.....	43,610	....	111
Etgersleben .....	.....	.....	23,835	20,799	....	....
Ummendorf	736,249	708,649	27,600	25,177	....	....
Demmin .....	.....	.....	81,671	39,046	....	79
Oberlausitz .....	.....	.....	169,874	77,760	10,300	....
Gross-Gerau	1,318,964	1,255,457	63,507	35,000	....	....
Bockenem	759,316	718,135	41,179	41,179	....	....
Hedwigsburg .....	.....	.....	.....	47,218	....	<i>q</i> 98
Schaumburg	488,345	462,799	25,546	25,546	....	65
Altfelde .....	.....	.....	40,271	40,270	....	....
Wreschen	1,052,729	924,984	.....	55,411	....	84½
Mühlberg .....	.....	1,004,570	136,670	69,174	....	105
Marienwerder .....	.....	432,281	11,925	11,925	....	77
Mattierzoll	1,547,571	1,500,685	46,866	40,495	....	....
Emmerthal	1,115,369	1,038,067	77,302	77,225	....	....
Münsterberg .....	.....	.....	.....	.....	....	....
Kruschwitz .....	.....	.....	238,703	170,991	....	91½
Döbeln .....	.....	.....	.....	.....	....	....
Rethen .....	.....	.....	56,246	53,951	....	....
Langenwedding	594,770	569,522	25,247	23,027	....	....
Neustadt	930,233	866,801	63,472	59,252	....	....
Nakel .....	.....	.....	79,340	52,851	....	....
Sobbowitz .....	.....	.....	86,076	82,300	....	....

a Loss on sugar left over from last year.

b A special outlay.

c Last year's loss, M. 240,000, was covered by writing off 30% from the shares.

d Applied in reduction of debit balance of M. 149,918.

e Including M. 104,704 to cover last year's loss.

f Covered by the reserve fund.

g Including M. 46,600 to cover last year's loss.

h Applied in reduction of the debit balance of M. 76,179.

i " " " " M. 100,101.

CAMPAIGN 1886-1887.—(Continued from page 527.)

Company.	Net Profit.	Loss.	Carried forward or put to Reserve.	Dividend.	Capital.	
					Shares, &c.	Loan.
	Marks.	Marks.	Marks.		Marks.	Marks.
Malchin	45,068	.....	.....	.....	.....	.....
Ottmachau .....	.....	16,588	.....	.....	.....	.....
Riesenburg .....	.....	c 116,546	.....	.....	.....	.....
Hornburg .....	.....	.....	.....	3½%	300,000	.....
Altenau	d 52,146	.....	.....	.....	.....	.....
Markranstädt	54,045	.....	R. 2,758	.....	.....	.....
Badersleben	129,529	.....	.....	.....	.....	.....
Klützw	4,452	.....	.....	.....	.....	.....
Alt-Jauer .....	.....	f 85,959	.....	.....	.....	.....
Zülz	11,365	.....	.....	.....	.....	.....
Culmsee	386	.....	.....	.....	.....	.....
Göttingen	11,107	.....	.....	.....	.....	.....
Soest	28,989	.....	.....	4%	.....	.....
Etgersleben	h 3,036	.....	.....	.....	.....	.....
Ummendorf	2,423	.....	.....	.....	.....	.....
Demmin	i 42,625	.....	.....	.....	.....	.....
Oberlausitz	j 81,814	.....	.....	4%	1,200,000	.....
Gross-Gerau	28,508	.....	.....	.....	.....	.....
Bockenem .....	.....	.....	.....	.....	.....	.....
Hedwigsburg	60,567	.....	.....	.....	.....	.....
Schaumburg .....	.....	.....	.....	.....	.....	.....
Altfelde	1	.....	.....	.....	.....	.....
Wreschen	72,333	.....	R. 72,333	.....	.....	.....
Mühlberg	67,496	.....	.....	.....	.....	.....
Marienwerder .....	.....	.....	.....	.....	.....	.....
Mattierzoll	6,371	.....	.....	.....	.....	.....
Emmerthal	k 77	.....	.....	.....	.....	.....
Münsterberg .....	.....	l 138,764	.....	.....	1,000,000	.....
Kruschwitz	m 67,713	.....	.....	.....	.....	.....
Döbeln .....	.....	77,566	.....	.....	690,000	.....
Rethen	2,295	.....	.....	.....	.....	.....
Langenwedding	2,220	.....	.....	.....	.....	.....
Neustadt	4,180	.....	.....	.....	.....	.....
Nakel	26,489	.....	.....	.....	699,000	.....
Sobbowitz	3,777	.....	.....	.....	.....	.....

j Applied in reduction of the debit balance of M. 18,839.

k The saccharine content of the beets was 12.19%.

l Making their debit balance M. 478,475.

m Applied in reduction of the debit balance of M. 458,634.

n The cost of working was 53pf. additional.

o " " " 57½pf. "

p " " " 44½pf. "

q " " " 49pf. "

r " " " 56½pf. "

EXPERIMENTAL INVESTIGATIONS WITH REFERENCE TO THE DEVELOPMENT OF THE SUGAR CANE.

Translated from the Spanish.

I.

We begin an incomplete account of some facts which we have been studying in our *experimental field*, respecting the development of the sugar cane. For reasons which it is unnecessary to state, it has been impossible for us to examine all the phenomena to the extent that we would have wished; but in spite of so lamentable a defect, the results are sufficiently conclusive to leave no doubt of the fact that it is possible to base the cultivation of the cane upon new and productive principles. The circumstances under which we have operated have not allowed us to obtain even the true mean terms; but nevertheless the results are enough to demonstrate what would have been attained with more favourable appliances.

For the present we refrain from making any deductions, as our incomplete trials require repetition and variation, and above all to be carried out upon a larger scale. This first essay should be considered as a simple exploration of the ground, to pave the way for future experiments. When we have finished these, we can give a complete account, in which we will discuss and estimate all the facts which need be taken into consideration.

The better to analyse and appreciate the facts, we have commenced our observations upon isolated stoles of cane in such a way as to render perfectly independent the phenomena which they might bring to light. We shall afterwards bring the stoles together in proper order, planting cane in different ways in larger plots,—determining in this manner the rules which should govern cane growth to obtain the largest and best product.

We would call especial attention to the weight of the stalks. Although these weights may satisfy many, we believe them to be below the mark; and we can see an explanation and a cause for this debility, and feel sure of obtaining at least a normal weight as soon as we have improved the conditions under which further experiments will be made. The same remarks apply to the number of canes which are susceptible of being utilized for the extraction of sugar in a given time. This will also be increased.

We now proceed, without further remark, with the statement of the facts which we wish to make known.

1. On the 1st of October, 1885, we planted a cutting of Caveugerie cane which produced three sprouts. On the 11th of December following we pruned away the two outside shoots, leaving only the central one, which had five sprouts. The 3rd of January, 1886, it had ten sprouts; on the 20th of the same month twenty-one, and so on. The 12th of April, 1887, we cut the large canes, leaving the ratoons, the plant having yielded twenty-seven good stalks, and three in bad condition which were rejected. These twenty-seven canes without the tops weighed 188lbs. There remained upon the stole such a compact mass of ratoons that we could not count them exactly. We shall allow these to grow until the time for cutting next year.

2. The 18th of October, 1885, we planted another cutting of the same variety, and on the 29th it had produced two ratoons. One of these began to send out shoots on the 14th of November, and the other on the 20th. Both continued their development up to the 28th of April, 1887, when they were cut, yielding fifty-two ratoons, large and small, twenty-four useful stalks, and four dead canes, being in all eighty canes. The stole having in all given eighty sprouts. Some of the ratoons, cut very low, commenced to form joints, and were as much as eight inches in circumference. The twenty-four canes without tops weighed 152lbs. The ratoons, both large and small, weighed with their leaves 90lbs. Six selected canes weighed 40lbs. The canes from this stole were inferior as compared with those yielded by the former; but neither one nor the other represent the average of what they should have produced under better conditions of development. The stole having been suitably prepared, the ratoons began to make their appearance from the 2nd to the present date (12th of May, 1887,) *one hundred and twenty-nine* ratoons coming out with great vigour. To form any conception of the close grouping which these ratoons present, it is necessary to suppose them inclosed in a space of a regular shape, in which case they would cover a surface of only thirty-two inches square.

3. Immediately in front of this stole there is a still better one produced from a single eye, which we have left uncut, in order to ascertain next year what will be the total yield of the stalks it now contains, and what the suckers or sprouts which it now has growing will produce; data which, with the results obtained from other stoles in

similar or different circumstances, will allow us to establish comparisons and make deductions.

This third stole has at the present time 29 stalks and a vigorous group of strong ratoons. We should have cut them in January if we had wished to utilise them for the extraction of sugar, as they were then perfectly mature. It is evident that by leaving them standing until next year, they will suffer deterioration from various causes.

II.

4. In 1876, Mr. José Antonie Armand received from Mauritius a collection of canes composed of 26 varieties, and among them the Portii, which Mr. Horne, Director of the Botanic Garden, highly recommended, in a letter from Port Louis, as superior to all the rest, for the diameter and length of the joints, as well as the saccharine richness and abundance of its juice, which gave an extraction of from 75 to 79 per cent in common mills. Mr. José F. Scull has cultivated this variety, and our thanks are due to him for the means of carrying on experiments which have confirmed what Mr. Horne stated with regard to it.

On the 5th of Oct., 1885, we made a planting of this cane, and on the 14th of Nov. we transplanted one ratoon, which had five offshoots. This plant continued to grow until the 13th of April, 1887, at which date we cut the stalks, leaving the growing ratoons intact. These canes had been beaten down by the wind, and by others falling upon them. Besides, if we had wished to utilise them for the extraction of sugar, we should have cut them in Dec., 1886, as they were then perfectly mature. From all these causes they have much deteriorated, and the weight attained must be considered inferior to what we should have obtained in a proper season. Only 20 of the stalks were still in good condition, and there were 8 others more or less injured. Notwithstanding this, the 28 stalks gave a total weight, deprived of their tops, of 236lbs. Five of the best weighed 59½lbs., which gives an average of nearly 12lbs. for each cane. The mean weight of the 28 stalks might have been as high as 11lbs., for they were quite uniform in size, and they had been developed in a satisfactory manner. In that case we should have obtained a total weight of 308lbs. of cane, produced by a stole from a single eye, without taking into account the ratoons left standing to continue their growth, or the fact that the number of canes cut might have been greater. We will not detain the reader now to calculate how much a given extent of

land planted with Portii cane would yield when cultivated under the most favourable conditions, as we expect to be able to put this to the test. But we will at least affirm that the Portii cane is a magnificent variety, which, well cultivated, will give brilliant results.

5. On the 25th of Nov., 1885, we made a planting of Lusier cane, and on the 28th of Dec. we transplanted a ratoon produced from a single eye. This ratoon was extremely weak, so much so that it did not put out shoots until the month of March, 1886. Notwithstanding this, it acquired such vigour that it began ratooning profusely. A strong wind blew down the canes, bedding them all upon the ground. The 13th of April, 1887, we cut these canes, leaving the ratoons standing, and obtaining in all 34 stalks, some of which were in bad condition. Deprived of their tops, they weighed 190lbs. Five of the best weighed 42lbs., and consequently the mean weight of each was 8½lbs. The group of ratoons left standing is very fine.

The Lusier variety is handsome in its general appearance. It grows very rapidly, gives off a great many shoots, and the joints are large and long. It matures well. If you plant a good cutting, whose eye gives a well-constituted ratoon, the vigorous growth of the stalks is remarkable. In relation to this, cane planted the 29th of Oct., 1885, in different ways, we find among our notes made the 6th of June, 1886, the following observations:—"In Nos. 6 and 11 the influence of the nature of the ratoon produced by the cutting can be seen, for while these stoles are very exuberant, the others derived from different cuttings are far from being as good. The latter plants from the first ratoons being of the worst description, had to pass through a long struggling period of existence. It would be inopportune at present to enter into the important questions relating to the constitution of the germs, circumstances under which the canes were cut and care in cultivation, as to do this we should be obliged to make essential distinctions supplied by the study of a great number of results, which cannot be treated incidentally.

6. All the experiments made go to prove in the most absolute manner the value of employing the subterraneous stalk for the reproduction of cane, instead of using the aerial stalk. To state the case more clearly, the former is as good for this purpose as the best of the latter which can be selected. One single example among many will be sufficient to demonstrate this fact.

On the 25th of February, 1886, we washed in water a stole of

“crystalline” cane, so as to leave the roots perfectly free from earth, cutting away afterwards all the roots with a pair of scissors. We separated the subterraneous stalks, dividing them into short pieces, without leaving a single germ, and then planted them. On the 22nd of March we dug out one ratoon from the planting, placing it in ground prepared for it. The 12th of April, 1887, we cut off all the stalks at the surface of the ground, and obtained 22 canes, more or less developed, 2 ratoons of different sizes, 3 small shoots, and 4 canes lost through accidents, being a total yield of 54. The 22 canes, without tops, weighed 113½ lbs.

To explain this weight it is necessary to take into consideration the age of the cane, and the adverse circumstances under which it was grown, in spite of our care. If the conditions had been favourable, the development would have been much greater, and the same unfavourable results would have been obtained from the best cutting under like circumstances.

ALVARO REYNOSO.

THE SUGAR CRISIS IN BRAZIL.

We have received from Rio de Janeiro, a copy of a Memorial addressed by the *Centro da Industria e Comercio de Assucar* (Union of Sugar Manufacturers and Merchants), to the Brazilian Legislative Body, in which, after fully setting forth the present position of the sugar trade in every part of the world, especially in Germany, France, Russia, the United States, and Brazil, and discussing the causes which have led to the present unsatisfactory state of the Brazilian sugar manufacturers, they ask the assistance of the Government to aid them to emerge from their unpleasant position. The remedy which they propose, is, in few words, to take a leaf out of the European beet sugar manufacturer's book, and adopt all or any of the fiscal regulations, which, as they say, have brought about the prosperous condition of the sugar manufacturers in France and Germany. The arguments used are those with which we have all been familiarised during the past score of years; the interesting portion of the memorial consists in the urgent demand for bounties on exported sugar, just at the moment when all the leading sugar producing nations, not even excepting France (if report may be trusted), are willing to join in a Congress called together to endeavour to abolish these bounties.

DESCRIPTIVE LISTS OF SUGAR CANES CULTIVATED IN THE JAMAICA GARDENS.

From Bulletin No. 2 of the Botanical Department, Jamaica, which has been obligingly forwarded to us by Mr. W. Fawcett, the Director of Public Gardens and Plantations, we extract the following lists of sugar canes cultivated there:—

No. 1. Tourkoury.—Of stout habit; 10 to 14 canes in a clump; about 8 feet high; length of joints, 4 inches; circumference, 4 inches; colour white; leaves, light green; 4 feet 6 inches long, $1\frac{1}{2}$ inches broad; healthy canes, evidently suitable for moist districts; does not stand drought well. Percentage of trash, $25\frac{1}{2}$; juice, $74\frac{1}{2}$ (6.9 gals.); density of juice, 1.064: Arnaboldi, 21.

No. 2. Cuapa.—Of slender habit; 18 canes in a clump; average height, 9 feet; colour, black; length of joints, 4 inches; circumference, 4 inches; leaves, heavy, 4 feet long, $2\frac{1}{2}$ inches broad; stands drought well; not liable to get lodged; free from rust. Percentage of trash, $31\frac{1}{2}$; juice, $68\frac{1}{2}$ (6.3 gals.); density of juice, 1.066: Arnaboldi, 22.

No. 4. Batramie.—Of strong habit; 12 to 14 canes in a clump; average height, 7 feet; colour, striped; length of joints, 4 inches; circumference, 4 inches; leaves, heavy, $4\frac{1}{2}$ feet long, 3 inches broad; stands the drought well; not liable to get lodged; "a strong cane." Percentage of trash, $33\frac{1}{2}$; juice, $66\frac{2}{3}$ (6.2 gals.); density of juice, 1.074: Arnaboldi, 24.

No. 5. Waphendnow.—Similar to last in habit and colour; a strong cane. Percentage of trash, 31; juice, 69 (6.4 gals.); density of juice, 1.066: Arnaboldi, 24.

No. 6. Tiboo.—Prolific cane; 12 to 14 canes in a clump; average height, 8 feet; colour, striped; length of joints, 3 and 4 inches; circumference, $5\frac{1}{2}$ inches; leaves, heavy, broad, and abundant; stands drought well; not liable to get lodged. Percentage of trash, $31\frac{1}{4}$; juice, $68\frac{3}{4}$ (6.4 gals.); density of juice, 1.069: Arnaboldi, 24.

No. 7. Hillii.—Of slender habit; 16 canes in a clump; height, 9 feet; length of joint, 5 and 6 inches; circumference, $3\frac{1}{2}$ inches; leaves, heavy, round stem, 4 feet long, 3 inches wide; stands drought well; stools freely; a prolific small black cane, suitable for poor soils. Percentage of trash, 35; juice 65 (6.0 gals.); density of juice, 1.067: Arnaboldi, 22.

No. 8. Seete.—Of stout habit; 12 to 16 canes in a clump; height, 8 feet; colour, a greenish yellow when young, white when matured; length of joint, 4 inches; circumference, 3 inches; foliage very heavy; length, 4 feet; breadth, 3 inches; stands drought moderately well; a good cane for experimental trial in good soil. Percentage of trash, 30; juice, 70 (6·5 gals.); density of juice, 1·082: Arnaboldi, 28.

No. 9. Ysaquia.—Of stout free habit; 15 canes in a clump; height, 7 feet; colour, brown, with white stripes; length of joint, 3 inches; circumference, 5 inches; foliage rather heavy; stands drought fairly well; somewhat liable to get lodged, and with rust on upper joints. Percentage of trash, 37; juice, 63 (5·8 gals.); density of juice, 1·084: Arnaboldi, 28.

No. 10. Bouronappa.—Of stout vigorous habit; 20 canes in a clump; height, 8 to 10 feet; colour, light purple; length of joint, 3 and 4 inches; circumference, $4\frac{1}{2}$ inches; foliage rather heavy; stands drought well; from its luxuriant quick-growing habit liable to lodge, but it is one of the finest canes of the series as regards luxuriance of growth, and should prove an acquisition in districts with moderate rainfall. Percentage of trash, 40; juice, 60 (5·5 gals.); density of juice, 1·079: Arnaboldi, 26.

No. 11. Barkley.—A white cane similar to last; fewer canes in the stools but of stouter habit; foliage heavy; stands drought moderately well; free from rust and of free vigorous growth. Percentage of trash, 34; juice, 66 (6·1 gals.); density of juice, 1·078: Arnaboldi, 26.

No. 12. Pine.—Of light habit; 12 canes in a clump; height, 9 feet; colour, white; length of joint, 4 inches, circumference, 5 inches; leaves light, 4 feet long, 3 inches broad; stands drought well; stools moderately well. A fair hard cane, very healthy and clean. Percentage of trash, 30; juice, 70 (6·5 gals.); density of juice, 1,078: Arnaboldi, 26.

No. 13. Nagapoury.—Of strong vigorous habit; 16 canes to a clump; colour, cream white; length of joint, 4 inches, circumference, 5 inches; foliage heavy; does not stand drought but grows well in fairly moist situations; an excellent cane under irrigation. Percentage of trash, 31; juice, 69 (6·4 gals.); density of juice, 1·065: Arnaboldi, 21.

No. 14. Naga.—Of fine slender habit; 20 and 25 canes to a clump; colour, black; length of joint, 4 inches, circumference, 3 inches;

leaves moderately heavy but narrow ; stands drought well ; evidently an excellent cane for arid districts or as a fodder plant on poor soils. Percentage of trash, 35 ; juice, 65 (6.0 gals.) ; density of juice, 1.072 : Arnaboldi, 24.

No. 15. Tsimbic.—Of stout habit ; 15 canes to a clump ; height, 9 feet ; colour, yellow with purplish stripes ; length of joint, 5 inches, circumference, 5 inches ; foliage light and leaves narrow (2 inches) ; stands drought moderately well. A good striped cane of fine attractive habit. Percentage of trash, 33 ; juice, 67 (6.2 gals.) ; density of juice, 1.082 : Arnaboldi, 27.

No. 16. Vulu Vulu.—Of stout habit ; 10 to 12 canes in a clump ; height, 8 to 10 feet ; length of joints, 4 inches ; colour, fine yellow ; foliage, light ; stands drought well ; not liable to lodge ; free from rust. Percentage of trash, 35.75 ; juice, 64.25 (5.9 gals.) ; density of juice, 1.078 : Arnaboldi, 26.

No. 17. Kakæ.—Of stout habit ; 16 to 18 canes in a clump ; height, 10 feet ; colour, black violet ; length of joint, $3\frac{1}{2}$ inches, circumference, 5 inches ; foliage, very heavy and of a dark green : as in most of the black or violet canes this stands drought well ; it is free from rust and not liable to get lodged. Percentage of trash, 36 ; juice, 64 (5.9 gals.) ; density of juice, 1.084 : Arnaboldi, 28.

No. 18. Egyptian.—This cane has not been very successful at Hope, but in 1884 the report was as follows :—Of vigorous habit and quick growth ; 30 to 40 canes in a clump ; height, 7 to 8 feet ; colour, striped green ; length of joint, 4 inches ; circumference, 3 inches ; foliage light and narrow ; a fine clean healthy cane, very hardy, and likely to thrive in dry districts. Percentage of trash, 41 ; juice, 59 (5.4 gals.) ; density of juice, 1.077 : Arnaboldi, 27.

No. 20. Brisbane.—Similar to the Malay cane already tested and distributed as No. 76.

No. 21. Grand Savanne.—Of strong compact habit with stout joints ; 20 canes to a clump ; height, 10 feet ; colour, light purple ; length of joints, $5\frac{1}{2}$ inches ; circumference, $5\frac{1}{2}$ to 6 inches ; foliage, dark green and broad ; a good cane in appearance, but not yet tested.

No. 22. Bourow.—Of light graceful habit ; number of canes to a clump, 12 to 16 ; height, 8 feet ; colour at first green, then a golden yellow ; foliage, light and narrow ; does not stand drought well, but grows rapidly under irrigation ; not liable to get lodged. Percentage of trash, 37 ; juice, 63 (5.8 gals.) ; density of juice, 1.074 : Arnaboldi, 25.

No. 23. Liguanea.—Of short stunted habit; number of canes in each clump, 10 to 12; height, 6 to 8 feet; colour, dark purple or black; length of joint, $3\frac{1}{2}$ inches; circumference, 5 inches; foliage light; length, $4\frac{1}{2}$ feet; breadth, 3 inches; stands drought very well. Percentage of trash, $33\frac{1}{2}$; juice, $66\frac{2}{3}$ (6.2 gals.); density of juice, 1.076: Arnaboldi, 25.

No. 24. Norman.—Of strong habit and erect; number of canes in each clump, 14; height, 11 feet; colour, light purple or mauve; length of joints, 5 inches; circumference, $5\frac{1}{2}$ inches; foliage, pale green, with a light purplish vein running down the centre of each leaf. Percentage of trash, 36; juice, 64 (5.9 gals.); density of juice, 1.012: Arnaboldi, 27.

No. 25. Green Rose-Ribbon.—Of stout upright habit; number of canes in each clump, 18; height, 10 feet; colour, pale yellow; length of joint, 4 and 5 inches; circumference, 6 inches; foliage coarse and heavy. This cane stands drought moderately well; is somewhat liable to get lodged and shows rust. Percentage of trash, 39; juice, 61 (5.6 gals.); density of juice, 1.064: Arnaboldi, 21.

No. 26. Daura.—A weak yellow cane, apparently of little value.

No. 27. Nain.—Habit strong, with large stools ratooning freely; canes in each clump, 35; height, 10 feet; colour, light brown; length of joint, 5 inches, circumference, 5 inches; foliage of a fine texture and dark green, leaves short and broad. This cane stands drought well; a clean healthy cane of very vigorous habit. Percentage of trash, 34; juice, 66 (6.1 gals.); density of juice, 1.066: Arnaboldi, 23.

No. 28. Queensland.—Of upright habit; canes in each clump, 30; height, 12 feet; colour, pale yellow; length of joint, 6 inches, circumference, 5 inches; foliage large and heavy; grows well in dry situations; liable to get lodged; free from rust. Percentage of trash, 37.66; juice, 62.34 (5.7 gals.); density of juice, 1.068: Arnaboldi, 23.

No. 29. Ko-Keia.—Slender upright habit; canes in each clump, 35; height, 8 feet; colour, white with red stripes; foliage moderately heavy. A prolific useful cane for fodder purposes. Percentage of trash, 38; juice, 62 (5.7 gals.); density of juice, 1.079: Arnaboldi, 26.

No. 30. Lahina.—Of rather delicate habit at first, but afterwards a strong fine cane; canes in each stool, 18; height, 9-11 feet; colour, yellow; length of joint, 5 inches, circumference, $5\frac{1}{2}$ inches; foliage, pale green and moderately light. This cane does not stand drought

well and is liable to get lodged. A bright free growing cane under irrigation, very much like the best type of Bourbon canes. Percentage of trash, $37\frac{1}{2}$; juice, $62\frac{1}{2}$ (5.8 gals.); density of juice, 1.076; Arnaboldi, 25 (Beaumé 10).

No. 31. Keni-Keni.—Of slender habit; 12-15 canes in a clump; 8-10 feet high; length of joints, 5 inches, circumference, 4 inches; colour, white; leaves green, 4 feet 6 inches long, $2\frac{1}{2}$ inches broad; fine healthy cane suitable for "seasonable" districts; does not stand drought well. Percentage of trash, 33; juice, 67 (6.2 gals.); density of juice, 1.080: Arnaboldi, 26.

No. 32. China.—Very similar in habit, size, and characteristics to last. Percentage of trash, 35; juice, 65 (6.0 gals.); density of juice, 1.066: Arnaboldi, 22. [Canes Nos. 28, 30, 31, and 32 all partake of general characteristics, and belong to the best type of white canes.]

No. 33. Po-a-ole.—This would appear to be identical with the Mauritius cane, No. 96, already described, and tested in 1880. "A stout black cane of fine habit and growth, leaves rather heavy; stands drought well; rind rather hard; not subject to lodge; makes a good grain of sugar, and yields at the rate of $2\frac{1}{2}$ hhds. per acre."

No. 34. Ko-poapa.—Of strong rapid growth; 18 canes in a clump; about 11 feet high; length of joints, 4 inches; circumference, 5 inches; colour, white; leaves, moderately heavy, 5 feet long, $2\frac{1}{2}$ inches broad; stands drought well; not liable to get lodged; a fine white cane, one of the best in the collection for dry districts; always healthy, and throwing good large stools. Percentage of trash, 28; juice, 72 (6.4 gals.); density of juice, 1.063: Arnaboldi, 21 (Beaumé, 8.2-5.)

No. 35. Lakoua.—Of upright and somewhat slender habit; about 12 feet high; length of joints, 6 inches; circumference, 4 inches; colour, white; leaves, dark green; 5 feet long, 3 inches broad; healthy, vigorous cane and free from rust. Percentage of trash, $30\frac{1}{2}$; juice, $69\frac{1}{2}$ (6.4 gals.); density of juice, 1.074: Arnaboldi, 24 (Beaumé, 9.4-5.)

No. 36. Vituahuala.—Strong vigorous habit; 30 canes in a clump; about 11 feet high; length of joints, 3 inches; circumference, 4 inches; colour, pale when young, growing into a light purple; leaves, dark green, $4\frac{1}{2}$ feet long, 3 inches broad; somewhat liable to lodge; free from rust. Percentage of trash, 24; juice, 76 (7.0 gals.); density of juice, 1.055: Arnaboldi, 18 (Beaumé, $7\frac{1}{2}$).

No. 37. Sacuri.—Of strong habit and very rapid growth; 20 canes in a clump; average height, 11 feet; length of joints, 6 inches; cir-

cumference, 5 inches; leaves, somewhat heavy, 5 feet long, 3 inches broad; likely to lodge; free from rust. Percentage of trash, 25; juice, 75 (7.9 gals.); density of juice, 1.076: Arnaboldi, 25 (Beaumé, 10).

No. 38. Cuban.—Habit, light; 12 canes in each clump; height, 10 feet; joints, long and straight; leaves, light green, 5 feet long, 2½ inches broad; suitable for moist districts only; a clean, healthy cane, resembling the Bourbon. Percentage of trash, 33½; juice, 66½ (6.2 gals.); density of juice, 1.074: Arnaboldi, 24 (Beaumé, 9.4–5).

No. 39. Horne.—Habit, strong; 20–25 canes in each clump; height, 10 feet; colour, pale with purple and violet stripes; length of joint, 4½ inches; circumference, 5 inches; leaves, heavy, 5 feet long, 3 inches broad; stands drought well, and not liable to get lodged. Percentage of trash, 24¼; juice, 65¾ (6.1 gals.); density of juice, 1.076: Arnaboldi, 25 (Beaumé, 10).

No. 40. Samuri.—Of slender habit; 16 canes in each clump; average height, 8 feet; colour, black with pale purplish stripes; length of joints, 2½ inches; circumference, 4 inches; leaves, light, 5 feet long, 2½ inches broad; rather hard rind; stands drought well. Percentage of trash, 40; juice, 60 (5.5 gals.); density of juice, 1.079: Arnaboldi, 26 (Beaumé, 10½).

No. 41. Brèhèret.—Of strong habit; 14 canes in each clump; height, 8 feet; colour, black; length of joints, 2½ inches; circumference, 5 inches; foliage, light, 4 feet long, 2½ inches broad. The joints of this cane are strikingly short and heavy; it stands drought well, and would be very suitable for dry districts. Percentage of trash, 33½; juice, 66½ (6.2 gals.); density of juice, 1.079: Arnaboldi, 26 (Beaumé, 10½).

No. 42. Mamuri.—Of strong habit and rapid growth; 30 to 40 canes in each clump; height, 10–12 feet; colour, light brown with the outer epidermal layer dry and chaffy; length of joints, 4 inches; circumference, 3½ inches; foliage, light; leaves, 4 feet long, 3 inches broad; a clean, healthy, but somewhat peculiar looking cane; stands drought well. Percentage of trash, 34; juice, 66 (6.1 gals.); density of juice, 1.084: Arnaboldi, 28 (Beaumé, 11.1–5).

No. 42. Marabal.—Of slender habit; does not ratoon well; 8 to 10 canes in a clump; about 6 feet high; length of joints, 4 inches; circumference, 4 inches; colour, brown; leaves, thin, light green, 5 feet long, 2 inches broad; does not stand drought well; liable to get lodged; not subject to rust or worms.

Salangore.—Of stout, upright habit; hardy; of rapid and luxuriant growth; ratoons well; 25 to 30 canes in a clump; 8 to 10 feet high; length of joints, 5 inches; circumference, $5\frac{1}{2}$ inches; colour, white; leaves, thick, light green, 5 feet 3 inches long, 3 inches broad; stands drought well; suitable for moist districts; not liable to get lodged; not subject to rust or worms; produces a sugar of fine quality and colour, should be cropped immediately it is ripe, as otherwise it begins to deteriorate.

No. 56. Hope.—At first a small slender cane; ultimately growing vigorously, often producing canes of 20 feet in length; 20 canes in clump; about 7 feet high; colour, light purple; length of joints, 4 inches; circumference, 5 inches; leaves, thick, dark green, 5 feet 6 inches long, 3 inches broad; stands drought well; not liable to get lodged; not subject to rust or worms.

No. 76. Malay.—Of short, stout habit; 12 canes in a clump; 6 feet high; colour, whitish with green streaks; length of joints, 4 inches; circumference, 5 inches; leaves, thick, heavy, dark green, 4 feet 6 inches long, 3 inches broad; does not stand drought well; rather delicate; liable to get lodged; subject to rust, but not to worms.

No. 16. Martinique.—Of slender habit; 10 canes in a clump; 6 feet high; colour, white; length of joints, 4 inches; circumference, 4 inches; leaves, thin, light green, 5 feet long, 2 inches broad; does not stand drought well; liable to get lodged; free from rust; not subject to worms.

Elephant.—Of stout, upright habit; a vigorous grower with early maturity, but brittle; 18 canes in a clump; 8 to 10 feet high; colour, light green, turning yellow when ripe; length of joints, 4 to 5 inches; circumference, 6 inches; leaves, thick, heavy, dark green, 5 feet long, 3 inches broad; stands drought well; liable to get lodged; free from rust; not subject to worms; requires very rich soil, a moist climate, and to be taken off as soon as it is ripe; ratoons well the second year, but like most vigorous growers it requires to be renewed in third or fourth year; in favourable localities it throws immense canes, looking almost like clumps of bamboos; the yield per acre has not, however, been quite equal to the show of canes, but it has yielded at the rate of 2 to $2\frac{1}{2}$ tons of sugar per acre.

Otaheite.—Of slender, upright habit, hardy, and ratoons well; 14 canes in a clump; 8 feet high; colour, light purple; length of joints, 5 inches; circumference, $4\frac{1}{2}$ inches; leaves, thin, light green, 5 feet

long, $2\frac{1}{2}$ inches broad; stands drought well; not liable to get lodged; free from rust; not subject to worms.

Red Ribbon.—Of stout habit, hardy, a rapid grower, ratoons well; 20 to 25 canes in a clump; 10 feet high; colour, striped purple and red; length of joints, 5 inches; circumference, 5 inches; leaves, heavy, dark green, 5 feet long, $2\frac{1}{2}$ inches broad; stands drought well; not liable to get lodged; not subject to rust or worms.

Java.—Of stout, upright habit; ratoons well; 12 to 15 canes in a clump; 8 feet high; colour, light purple; length of joints, 5 inches; circumference, $5\frac{1}{2}$ inches; leaves, heavy, light green, 5 feet 8 inches long, 3 inches broad; stands drought well; not liable to get lodged; not subject to rust or worms.

Violet.—Of slender habit; ratoons well; 18 canes in a clump; 8 feet high; colour, dark purple; length of joints, 4 inches; circumference, 5 inches; leaves, thick and heavy, dark green, 5 feet long, 3 inches broad; stands drought well; liable to get lodged; subject to rust and worms.

COMBINATION OF UNITED STATES' SUGAR REFINERS TO REGULATE SUPPLY BY THE DEMAND, AND THEREBY BRINGING UP PRICES TO A PAYING BASIS.

The following we take from *Messrs. Willett, Hamlen & Co's, New York Circular* of October 13th:—

“It may be considered a settled fact that a combination has been completed, including all the New York Sugar Refineries and the Boston Refineries, with one exception, thus bringing under the management and control of a Committee of Eleven Refiners almost the entire consumption of raw sugar and production of refined sugar in the United States. The combination represents a capital of say fifteen million dollars, apportioned to the different refineries on an equitable basis for the division of profits. The only sugar refineries in the United States, not included in the “Trust” or combination, are two refineries in Philadelphia, one in Boston, three small refineries in New Orleans, one in St. Louis, but not running, and two in San Francisco.

“The Committee have full control of the production of refined, so that it can be always regulated by the demand; by the running full, or closing, or partial closing of any refinery, and will have no difficulty in regulating the prices of refined to a paying basis, as compared with market price of raw sugar. It is not likely that large profits will be demanded, as this course would antagonize the sixty million

sugar consumers, who would unite in demanding from the next Congress the entire removal of sugar duties on both raw and *refined* sugar. It is not to be doubted, however, that such a combination as this marks a crisis in the sugar trade. It has been led up to by the disastrous condition of the business for a series of years, until the refiners have been forced to do something for self protection. The action of the Government in continually reducing the drawback on exports, until exports ceased, thereby giving the refiners no outlet for their surplus production, was undoubtedly the last straw which forced them to unite.

“This plan undoubtedly will protect their interests fully, and if carried out conservatively, it would also appear to be in the interest of the dealers in refined sugar throughout the country by avoiding those violent fluctuations in prices, which have been the frequent result of over production one week, and under production the next week, when each refinery was running independently. And for the same reason the new system may not necessarily be objectionable to the consumers of sugar, as it does not appear to have an influence in the direction of increasing the price of raw sugar, and thereby of refined, but rather the contrary, as it may result eventually in doing away with all competition in the raw sugar markets by having virtually but one buyer for the United States, in much the same way as is now being done by the rope makers of the United States, under a similar combination recently formed. For the present, however, the buying of raw sugar will continue as heretofore by each refiner separately, but the unity of interests cannot fail to have some influence in diminishing former competition. The sugar importers may be the greatest sufferers, although it is said that a liberal policy is to be pursued towards them.

“The culmination of this most important movement just at this time, as Congress is about to assemble, and when a general demand exists for a reduction of surplus revenues, makes it very probable that the advocates of a repeal of sugar duties will receive such large accessions, that the minority interests of domestic cane (and beet production in its infancy) will be lost sight of, under the erroneous supposition that refiners are opposed to a repeal of sugar duties (except on refined sugar), and a tariff bill will be passed largely reducing or repealing entirely the duty on raw sugar. This result certainly seems more likely to occur than it has at any previous session of Congress, and the action of the refiners will stimulate it wonderfully. Under the influence of the constantly improving statistical position which made further progress this week, prices of both raw and refined are higher by 1-16c. in raws and 7-16c. on refined, to bring it nearer the parity of the raw sugar market.”

THE PROPOSED INTERNATIONAL CONFERENCE ON SUGAR BOUNTIES.

The following further correspondence has taken place between the Sugar Refiners' Committee and the Foreign Office:—

21, Mincing Lane, 22nd September, 1887.

THE MOST HON. THE MARQUIS OF SALISBURY.

My Lord,—With reference to my letter of the 18th August, I am desired by the British Sugar Refiners' Committee respectfully to ask whether Her Majesty's Government contemplate fixing any limit of time beyond which it would be undesirable that the French Government should further delay the meeting of the conference on sugar bounties by failing to reply definitely to the invitation, and whether, if such a limit of time be fixed, it is the intention of Her Majesty's Government, on its expiration, to invite the other Powers to assemble without the co-operation of the French Government.

The influence of the foreign bounty-fed competition upon the legitimate trade of British refiners in their own markets is becoming so rapidly intensified that they feel that no further delay should take place in procuring some remedy for a state of things which is entirely without a parallel in the annals of British industry, no other manufacturers, so far as they are aware, having ever been prevented by the state subsidies of foreign governments from selling British goods on British markets.

My Committee venture to hope, therefore, that your Lordship may very shortly be able to inform them that the conference is about to be held without further delay.

I am, my Lord,

Your obedient servant,

GEORGE MARTINEAU.

Foreign Office, September 27, 1887.

Sir,—I am directed by the Marquis of Salisbury to acknowledge the receipt of your letter of the 22nd instant on the subject of the proposed sugar conference, and in reply I am to inform you that Her Majesty's Government have pressed for a definite answer from the French Government to the invitation addressed to them to join the conference.

I am, Sir,

Your most obedient humble servant,

P. W. CURRIE.

George Martineau, Esq., 21, Mincing Lane, E.C.

For latest intelligence respecting proposed Sugar Congress see page 561.

THE SUGAR INDUSTRY IN EUROPE FROM AN UNITED STATES' CONSUL'S POINT OF VIEW.

The following, which appears in the Report of the United States' Consul at Bristol, to his Government, is valuable and interesting at the present time :—

He says: "The beet crop of the world in 1870 reached 942,000 tons, while in 1884-85 it had increased to 2,545,000 tons. The cane crop in 1870 was 1,661,000, while in 1884 it reached 2,260,000 tons. Thus in 1870 the beet industry produced 37 per cent. of the total supply, while in 1884-85 it produced 53 per cent. The consumption of sugar in the United States and Europe has risen from 2,600,000 tons in 1880 to 3,700,000 in 1885; but production, fostered and stimulated by the continental bounties on beet-root growing, has outstripped consumption. The proportion of bounty-fed and non-bounty-fed sugar in the consumption of the United Kingdom has risen from 5 per cent. in 1863 to 26 per cent. in 1873, to 37 per cent. in 1878, and to 55 per cent. in 1885. Bounties have been largest in Germany and Russia. During the first nine months of 1886 Great Britain imported from Germany nearly 4,000,000 cwt. of raw sugar, and 1,250,000 of refined sugar, not one pound of which would have been imported, nor would the beets that made the sugar have been grown, perhaps, if natural laws had been allowed to govern the competition between cane and beet sugars; but under the fertilizing effects of the bounty the German crop has increased from 412,000 tons of roots in 1879-80 to 2,500,000 in 1884-85. The bounty amounts to about \$9.70 per ton of sugar, but it is difficult to say exactly what it is, owing to the indirect method of figuring it, the method pursued being to levy a duty or tax upon the beet-root, and then upon its manufacture into sugar to repay the tax upon the assumed or estimated number of tons of beet that were employed. In practice this estimate is always too high; in other words, the saccharine matter in the root is much underestimated, and hence the receipt of a drawback on numbers of acres of beets never grown. The method is analogous to that until very lately in existence in the United States for paying a veiled bounty to refiners, and, though commending itself to France so strongly that it has lately adopted the same system, our consul-general at Berlin in a late able report tells us that it is so unsatisfactory in its results to the Germans that strenuous efforts will be made to

alter it. The import of refined sugar from Russia sprung from almost nothing in 1875 to 800,000 cwt. in the first nine months of 1876. Under the influence of a heavy protective duty the beet crop rose from 275,000 tons in 1879-80 to 370,000 tons in 1884-85, and to 500,000 in 1885-86, and there was an enormous accumulation of refined sugar for which there was no home market; hence in the spring of 1875 the Russian Government surprised the refiners of the world by announcing the unprecedented and extravagant bounty upon refined sugar exports of \$1.50 per cwt., which was afterwards reduced to \$1.20. The measure was not intended to be permanent. The Russian minister of finance is reported to have declared in April, 1886, that the then existing bounties had had the desired effect of freeing the Russian market from the accumulated stocks, and that it was not the intention of the Government to supply foreign consumers with cheap sugar at the cost of the Russian State and of Russian consumers. I have in vain sought for information as to whether this bounty still exists, but it is believed in England that it does, though the accumulated stock having been got rid of it does not stimulate exports as formerly.

“The import of refined sugar from France during the first nine months of 1886 was less than 500,000 tons. This nation, the first to adopt, more than twenty-five years ago, the sugar-bounty policy, stimulated production to a maximum of 465,000 tons of beet roots in 1875. In this year reductions were made in the amount of bounty, and again in 1880, and production fell off to about 300,000 tons. But in 1884 a heavy bounty was again granted to certain classes of sugars to enable them to compete with what is known as moist sugar in England. Naturally the makers of loaf-sugar also demanded State aid, with the result of the introduction this year of the German system so well worked as to produce enormous bounty. The effect of this new legislation has just been felt in this country. Fine French crystals are selling for about \$3.50 per cwt. It is this irruption of French sugar which has so suddenly supplanted the American granulated since November, 1886, though the simultaneous lowering of the American drawback was also a factor, though I suspect not quite so important a one.

“The import of refined sugar from Holland and Belgium—all bounty-fed—amounted during the first nine months of 1886 to nearly 1,000,000 cwt.

“The imports of refined sugar from the United States were, in 1883, 6,254 tons. In that year a rate of drawback was established that amounted to so considerable a bounty that in 1884 the import sprang up to 52,113 tons and in 1885 to 114,930 tons, and during the first eleven months of 1887 to 1,418,110 cwt. (70,900 tons). The Secretary of the British Sugar Refiners' Committee said in April, 1886: ‘I am in a position to state that it—the sugar bounty in America—is exactly £2 (\$9.70) per ton, or 2s. (48 cents) per cwt.; that is the legal bounty.’ How he got into a position that enabled him to state what the American Government and many individuals were endeavouring in vain to discover, I am unable to say; but from his statement and those of others, it may be said that the general idea in England is that the American bounty amounted to between \$7.40 and \$9.70 per ton. The Russian, German, and American bounties have been what the English refiners particularly feared during the past year. They could cope, they said, with the French, Dutch, and Austrian, but they find they cannot cope with the new French bounty. The reduction of the United States drawback, which went into effect on November 1, 1886, on refined sugar, from \$2.82 per pound to \$2.60 was simultaneous with the large import from France of absurdly cheap crystals (the effect of increased bounties), so that the American granulated has been driven from the British market during the last month of 1886, and was seriously interfered with during a considerable portion of the year, the import being reduced by more than 35,000 tons. Even if in future relieved of the extraordinary competition of the French bounty, I cannot see that the United States can compete in this market, except that the new drawback amounts to a bounty, or that plethora of stock will force the refiners to throw some on this market regardless of returns. We have seen that in Russia in 1875, and in France in 1886, when the home market became blocked, the Government interposed and paid the refiners largely that they might ship abroad. In Germany last year the refiners voluntarily limited production, or there, too, would have been observed an enormous overplus which refiners would in all probability have asked the State to help them unload. The fact is, the continental sugar industry has become a confirmed parasite of the State, and is helpless, enfeebled, and doomed to die if the support be removed. The United States refiners cannot compete in Europe unless they, too, are subsidized by the Government.

“It is worthy of attention that the English refiners are not only handicapped by the actual cheapness of foreign refined sugar, but also by the uncertainty that attends the action of foreign Governments. The enormous bounty of Russia came without notice, and is said to have reduced the values of fine sugars 75 cents per cwt. The bounty lately introduced by France has cut prices severely. If the refiners are stimulated to economy in processes and to improvements in machinery, to meet the foreign competition, they no sooner go earnestly to work than they are disconcerted by some unexpected foreign action. So they are all thoroughly discouraged, and one by one are closing their refineries. In this connection it is worthy to note that the receipts of unrefined sugar in Great Britain for eleven months of 1886 from the continent, as compared with corresponding period of 1885, show a falling off of 67,413 tons, while the corresponding figures with respect to refined sugars show an increase of 64,000 tons. A volume could not show more clearly than do these figures the disadvantages under which English refiners work. Again and again have they petitioned the Government for aid. Again and again have they pointed out that not only were large refining interests ruined in England and thousands of men driven out of employment, but that large cane plantations in the colonies, particularly in the West Indies, were going out of cultivation, that their owners were being ruined, and that their labouring population were reduced almost to starvation. But the answer of the Government has always been that if foreign Governments were guilty of the economic folly of providing cheap sugar for England, that England would not balk their aims by interposing a countervailing duty. But this answer has been esteemed by failing refiners and ruined planters as poor consolation; and the people who have had the benefit of the cheap sugar, I think, so far as I can judge, agree with them, and would willingly sacrifice a penny or two a pound on sugar, and, in this particular instance, their robust free-trade principles, in order to maintain their domestic and colonial sugar interests.

BORNEO SUGAR CANE FOR JAVA.

The *Indische Mercur*, of October 15th, states that the large cargo of Borneo sugar cane brought from Borneo by Mr. Van der Webb for the firm of Fraser, Eaton & Co., arrived safely at Sourabaya, and has been forwarded to the manufacturers.

This cane will probably be cultivated on a large scale in Java.

It is hoped that the results will be satisfactory, for the reports of the sireh disease in West Java are very bad, and we are also told that this disease is making great progress in the cane raised from cuttings in East Java.

GREAT ANTI-BOUNTY DEMONSTRATION IN HYDE PARK.

On October 3rd a demonstration was held in Hyde Park, in opposition to the system of foreign bounties, by which Continental sugar manufacturers receive State aid, to send cheap sugar to the British markets to the detriment of the sugar industry here. The promoters of the demonstration, in the placards appealing to workingmen to support the movement, disclaimed any political object, stating that their aim was to protest "against the system of foreign State bounties, which is crippling the trade of Great Britain and the colonies, and has been the cause of throwing thousands of workingmen out of employment in London and the provinces."

The various contingents, to form a procession to march to Hyde Park, met at different centres in the Eastern and South-Eastern districts. There were four divisions from the East-end, coming from Mile-end, Bow and Bromley, Limehouse, and Canning Town, and the assembly-places of two divisions marching from the south-east were Bermondsey Square and Station Road, near the Elephant and Castle. These six divisions marched with banners and bands to the Thames Embankment, near Blackfriars Bridge, where the procession that was to proceed to the park was formed. The East-end divisions joined in Commercial Road, and walked to the Embankment by way of High Street, Whitechapel, Ladenhall Street, and Queen Victoria Street, while the South-Eastern divisions affected a junction at the Obelisk, thence approaching the rendezvous by way of Blackfriars Road. The contingents from the East-end reached the Embankment shortly before one o'clock, and were soon afterwards joined by the South London divisions. The formation of the procession on the Embankment was witnessed by a large concourse of people, and a number of City constables were in attendance.

The procession moved off by way of New Bridge Street, and passed along Fleet Street, the Strand, Cockspur Street, Pall Mall, St. James Street, and Piccadilly to Hyde Park. The banners that were borne in the procession were of a varied character. There were some trade banners belonging to branches of the London Painters' Union and the Associations of Watermen, Lightermen, and United Riggers. The Sons of the Phoenix Temperance Society, too, was represented. Then there were banners with special inscriptions for the occasion. On a black one was, "Come to Hyde Park and bury the foreign

bounties," and another one was a large painting, in which prosperity and comfort were contrasted with poverty and distress, under the appeal, "Look on this picture and on that—what bounties have done." Other mottoes inscribed on banners were "Demand British Work for British Workmen," "Fairplay to all, favour to none," "Defend our Home Industries," "No work, no wages—no wages, no food," "Why strangle the Sugar Industry for foreign labour?" "Work, wages, food," "Justice to British Industry," "We defend home trade," "Save yourselves from starvation," "Let our workmen live," and "South London workmen, maintain our sugar and dock trades." Noticeable, likewise, was a forcible denunciation of anyone, "whoever he be, who would rob a poor man of his work."

Such a procession naturally attracted a good deal of attention while passing through the streets. In Pall Mall there was some hissing on going past the Reform Club, but in Piccadilly there was some cheering opposite the house of the Baroness Burdett-Coutts. Hyde Park was reached before three o'clock, and the procession proceeded to the vicinity of the spot known still by the name of the Reformers' Tree. Here a meeting was held, several vans being converted into as many different platforms a little distance apart. There were probably several thousand persons present, many appearing not to be in a very prosperous condition. The rough element also was represented, and during the speech-making there was now and again a slight diversion by a helter-skelter chase, led by the police, after some supposed wrongdoer, presumably a pickpocket.

The principal platform was Number 1, at which Mr. J. A. GILES presided, and in opening the proceedings he denied that he was recreant to his principles as a Radical in supporting that movement. He was perfectly willing to stand side by side with one of the greatest Radicals in England—Mr. Gladstone. He read a quotation from a letter in which Mr. Gladstone said that he was not in favour of subsidies by foreign States to a particular industry with the effect of crippling and distressing capitalists and workmen engaged in a lawful British trade. Mr. GILES went on to say that the bounty system was opposed to the principles of Free Trade, and it was not a question of Protection that was at issue, but one of fair play.

Mr. T. M. KELLY then moved the following resolution: "That this demonstration of working-men from all parts of the metropolis regard with indignation the fiscal system of this country, which per-

mits foreign labour and foreign merchandise to destroy our home industries and thus pauperise our industrial classes. And we resolve, in the highest interest of British labour and commerce, that countervailing duties as an act of defence should be applied to suppress foreign State bounties, in the true interest of home and colonial industry; and this meeting respectfully requests the Prime Minister and the Chancellor of the Exchequer to receive, at their earliest convenience, a representative deputation of bonâ fide workmen on this great question." He said had the working-men present been in employment, they would not have been in the park that day. What were they suffering from? An inroad of foreign pauper labour, which was crushing out not only English but Irish working-men. This was no political meeting, it was an industrial meeting, and the promoters cared as much for one political party as another. If Lord Salisbury's Government would not support the suppression of this base and brutal system of foreign bounties, then he was the enemy of that Government.

Fifteen years ago there were 33 great sugar refineries in East London, employing 18,000 men; now there were only two of these refineries throughout the whole of East London. All the others had been crushed out of existence by the unfair bounty system of France, Austria, Russia, Belgium, Holland, and other Continental countries. By the operation of this foreign bounty system over 50,000 men were thrown out of employment in this country, and there was great consequent distress in such centres as Liverpool, Bristol, Glasgow, and Greenock. But it was not alone the sugar refining industry which suffered. The docks were suffering from diminished profits, and the directors of those great undertakings were already contemplating a reduction of not only the staff salaries, but of the earnings of the labourer. It had been proved by experiment that good sugar could be grown in Ireland, but, owing to the foreign bounties, the industry in that country could not be developed. And not alone at home was suffering experienced, but the hardship of the system was felt in the colonies. They protested against the violation of every principle of free trade. They did not call that free trade which took the bread out of the mouths of thousands of working-men.

They did not want any protection in the sense that protection was ordinarily understood. What they wanted was that no helping hand should be lent to a system which unfairly enabled the foreigner to

undersell us in our own market, and so crush the lifeblood out of one of our oldest industries. In the area comprised by half a mile west, north, and south of Whitechapel Church there were 170,000 foreigners, all competing with English and Irish workmen and labourers. Who would have dreamt at one time that the pauperised foreigner would dare to compete with the costermonger from St. Luke's or Billingsgate? But so it was. This system must be stopped; there must be protection against this unfair competition; there must be an end of this system of foreign bounties. Already he heard that there was under consideration the application of a system of foreign State bounties to the leather and glass and some other trades—probably the woollen and cotton industries. He asked them to pass the resolution unanimously. They met under disadvantages and suspicions, some nasty things had been said about them, but they had come to Hyde Park to bury the bounties, so as to enable English and Irish working-men alike to freely and fairly face the competition of the world.

Mr. Stephen Price seconded the resolution, which was supported by Mr. M. Hanley and Mr. Cunningham. The resolution was then put, and carried without any dissent.

The same resolution was adopted at the other platforms, the speakers announced including Messrs. H. T. Hill, Pettyfer, Dumphreys, Cropley, J. Chandler, S. Peters, W. E. Varah, F. White, T. Parrett, G. Higgins, Lemon, and J. Maclean. It was stated that delegates were present from Liverpool, Bristol, Nottingham, Derby, Glasgow, and Greenock. The proceedings closed at about four o'clock, when the procession was re-formed, and left the park by the Marble-arch exit.

CYCLAMOSE (A NEW KIND OF SUGAR).

Sugar has been obtained from the well-known and beautiful plant "*Cyclamen Europæum*." The bulbs of the cyclamen are steeped for some days in weak alcohol, and the filtered solution is then concentrated and mixed with an excess of strong alcohol (96%), which serves to precipitate the sugar. The precipitate is dissolved in water, and mixed with slaked lime. Alcohol is added to the solution when filtered, and the voluminous precipitate which appears is put into a filter and washed with alcohol. It is then dissolved with water, and subjected to a current of carbonic acid. The filtered solution evaporated in vacuo above a vessel containing sulphuric acid leaves pure cyclamose.

AN AMUSING LETTER ON THE FRENCH BOUNTIES.

The following is a faithful translation of a letter which appears in the *Journal des Fabricants de Sucre* of October 5th, written with the view to show that there is no such thing as bounties on French sugar, and therefore, so far as France is concerned, no necessity for an International Sugar Congress!! It is only due to the Editor of the *Journal des Fabricants de Sucre* to state that he disclaims all responsibility in regard to the views herein expressed:—

We are in presence of a new danger. It is a long time since such a thing happened to us.

A project for an "International Conference for the abolition of premiums" is the order of the day, and threatens our existence.

And, be it observed, it is just at the moment when the Treasury is loading us with fresh expenses that this project springs up, destined to render them still more useless than they are by abrogating the law which serves as a pretext for them.

It seems to me that the project of a conference is based upon a misunderstanding by which our competitors would be glad to profit. Before you can abolish a premium the premium must exist. Where is this premium? One might offer a very handsome reward to the man that discovered it. To begin with, what is a "premium?"

If I am not mistaken, a premium is a sum added to the intrinsic value of a saleable article. For example, it is the 5 francs which Germany puts on every sack of German sugar which crosses her frontier. The German producer pockets this sum, which permits him, so much is clear, to proportionately reduce his selling price abroad. Not only is there nothing of the kind with us, but the question is to find out whether our manufacturers really are in the receipt of any Treasury gifts.

The fact appears to me—and I acknowledge that such is the case—to be that no one doubts it, except myself (!).

In a report made to the general meeting of French sugar manufacturers, M. Bernot says:—"People will not fail to make the objection that, by asking the Government to refuse to take part in the conference, we mean to continue to put our hand in the taxpayers' pockets." And M. Bernot, admitting like everybody else, the reality of this parasitic mode of existence, confines himself to pointing out extenuating circumstances.

The President of the St. Quentin Chamber of Commerce, in a letter addressed to M. Rouvier, writes:—In the present situation of the inland sugar production, the suppression of premiums would mean the annihilation of this industry.

To cut the matter short, it is a recognised thing, which no one has ever dreamed of contradicting, either before commissions, or Parliament, or general councils, or chambers of commerce, a fact admitted by the manufacturers of sugar themselves in the bosom of their own directorate; the law of 1884 is an endowment on which the sugar manufacturers, the growers of beets, and all the dependent industries live and get fat, like canons, at the expense of the taxpayers.

If there really were any sacrifice and any liberality shown, we should certainly have a right to say, with M. Bernot, that it is a well exercised liberality. But, to begin with, is it a fact? This is what I, for my own part, do not see very clearly, and I even ask myself if we have not here once more the old story of the live fish and the dead one. Before trying to explain why one is heavier than the other, we ought to begin by verifying the fact. Is there any "premium"? This is just what I want to try and make clear.

If the premium does not exist, there is no need to abolish it, or to take part in an international conference for that purpose. And the Government would here have a perfectly simple reason for refraining.

In order that anyone may be able to receive a premium, some one must pay it. Who pays it? The Treasury? Evidently not, for instead of giving a subvention to sugar, it is on the contrary subventionised by the sugar trade at the rate of one to two hundred millions yearly. Is it the taxpayer? Again not, for the taxpayer is here confounded with the consumer, and the duty by which the manufacturer profits on his excess over the legal yield is restored to the consumers in the form of a reduction in price.

Who is it then? Unless it be you, or I, or the great Mogul, I don't see who it is.

"But then," some will object, "if the present régime offers us no advantage, why are you so particular about its being maintained?"

Excuse me, I do not say that the present régime offers us no advantage, I say that this advantage is not a "premium." It is a simple protection against foreign competition, a protection which is enjoyed by very many other producers in all countries, and much more completely than by us, without any one dreaming of seeing in it a "premium."

As regards the sugar industry the mechanism of this protection is more complicated, but it is absolutely the same thing as regards results.

And, first of all, this "excess over legal yield," which they make such a noise about, is very problematical; we shall not always have what we have had for two years, an exceptional temperature which enriches the best at the expense of its weight, and yields of over 7, $7\frac{1}{2}$, and $7\frac{3}{4}$ per cent may very well be balanced by yields inferior to them.

Where then is the premium?

But let us suppose this excess over legal yield to be certain and considerable, let us even suppose that the *prise en charge* should be reduced to 4, to 2, to 0. Everything would then be "excédent." What next? What would happen? The manufacturers would make gold by the shovelful? Nothing of the kind.

Their advantage would merely be that of no longer having to fear foreign competition in the French market. Nothing more. And they would not the less be unable to deal with the inland competition. Now, as much more sugar is made than France can consume, it follows that the fall in prices would be immediate, and would have no other limit, (this is a fixed law) *than that at which production would no longer be economically possible in France.*

I do not suppose anyone will here make the objection that we should sell at very high prices to the inland consumer, unless we exported the surplus abroad. The argument would have no value except in the case of a general compact not realisable amongst manufacturers (I do not say among refiners), to which an end would very quickly be put. It is self evident that I shall not tamely submit to sell a sack of sugar for 30fr. abroad as long as I can get 31fr. in France, the inland prices will then be on a par with those obtainable abroad. The cost price of sugar would thus be reduced by 50fr., and it would soon be sold at 50fr. lower, and the tax would come out of the pocket of the taxpayer only to enter that of the consumer, which is all one and the same thing; thus, even under these conditions, there would be no premium. There would simply be one tax less.

But it is a long way from the fact that all the sugar produced is an "excédent" got out of the tax. It may possibly not be that any of it is so, if indeed it is not the other way altogether.

The *prise-en-charge* may not be attained (in any case, it will not be attained by everybody), and if we were to admit that an "excédent"

is a "premium," what becomes of this premium if there is no "excédent?" What becomes of it if there is a deficiency?

No, there is no "premium" in this case either. There is a chance bargain, extremely dangerous for the manufacturer. There is a two-sided contract such as the State makes with any contractor whatever, such, for example, as it made with the Compagnie des Allumettes, with about this difference—that the Compagnie des Allumettes signed a contract, the conditions of which were freely agreed to, whilst, as regards ourselves, they have been forced upon us, and we have to undertake the obligations, heaven knows with what excédent—charges, vexations, trickeries. There you have the real "excédent."

To sum up. Out of two things there must be one: either we shall have excédents—I speak of excédents gained in the manufacture—or we shall not have them. If we have them, the price of sugar will go down in proportion. This is, I repeat, the law of competition and the inevitable result of a production exceeding the consumption. If we have none, it is no use talking about them. In either case there is no premium, and in the most favourable case a simple protective duty with a special mechanism, which is in fact the following:—

Foreign sugar can only be consumed in France after paying a tax of 60fr. (There is indeed the so-called surtax of 7fr., but this closed window between two open doors is nothing but a dodge.) This would certainly be protection if the French sugar were not subjected to the same duty. But is it so? Certainly! The beetroot is taxed at 35fr. a ton and even at 35fr. 30cts., counting in the little charge of 30cts., which comes to this, that even if the French manufacturer gets his *prise-en-charge* (legal yield) his sugar pays a higher duty than foreign sugar, viz., 60fr. 43cts. in place of 60fr. There you have the whole of the act.

I no longer ask, Where is the premium? I say, Where is the protection? Now, we have need of protection. And I consider the two following statements as absolute economical aphorisms:—

1. *In spite of this protection, whatever it may be, even though it should be a radical prohibition, and even though the whole of our production should be free from taxation, we should remain behind our competitors in the foreign markets, so long as we have not, like them, coal and labour at a ridiculously low cost, so long as we have not carried our agriculture to the same degree of perfection.*

2. *In spite of this protection (of whatever sort it may be), the French*

producer will not sell his sugar in France at a higher price than abroad so long as the price does not fall below that at which he can produce economically.

It is, then, the least that they can do to keep the French market for us. Well now, this French market is not kept for us by that law of 1884, which Frenchmen are reproaching us with, and are attacking with a passion which only their ignorance of the question can explain.

The foreigner wants to turn us out of France completely and finally as out of everywhere else.

And that is why the Germans, with their amazing impudence, are talking of our premiums, whilst it is only they who have and have had them for forty years.

And we are simple enough to echo their words!

And we are going to jump, with our heads down, into the clumsy trap which they lay for us?

Well, be it so, but let it be known, and said also, that the aim of the Conference is not to suppress premiums, it is to re-establish, for the benefit of the Germans, those which give her the crushing advantage which she has over us.

Correspondence.

THE CENTRAL FACTORY OF PYRANGA, BRAZIL.

Rio de Janiero, 8th September, 1887.

TO THE EDITOR OF THE "SUGAR CANE," Manchester.

Dear Sir,—Thinking your readers may be interested in hearing something of the sugar industry in Brazil, I send the following translation:—

The district of Ponte Nova is in the Province of Minas Geraes, and can be reached in two days from Rio by rail. It was at one time famous for coffee production, but from causes I need not here enter into, the return from that plant does not now give the same profits in this district that it used to.

It is found, however, that these abandoned coffee lands are very suitable for sugar cane, and as this is the first attempt in these outlying or inland districts to manufacture cane sugar by the modern processes, the success of this venture is looked forward to with interest

in the vicinity of the Factory, or indeed I may say in the Province of Minas Geraes.

I am, yours faithfully,

A. SCOTT BLACKLAW.

P.S.—The original, in Portuguese, copied into the *Monitor Campist*, is sent you by newspaper post.

(Translation from the newspaper "*Rio Doce*.")

There was inaugurated on the 1st August the Central Sugar Factory of Pyranga. It is situated on the estate of the same name, and in front of the railway station of the Leopoldina Railway (of Brazil).

The proprietors of the Factory are Col. José de Almeida Campos, Dr. José Marianno Duarte Lanna, Venancio Marianno da Costa Lanna, Captain Ignacio Marianno da Costa Lanna, and José Marianno da Costa Mól, who have formed a partnership under the name of "Lanna and Almeida," with Dr. José Marianno as managing partner. The whole planning and arrangements for the construction and installation of the factory plant were entrusted to the well-known firm of Terris and Findlay, successors to Thomson, Black and Co., of Campos, in the Province of Rio de Janeiro.

The large building, with its two annexes, is constructed throughout of brick, and in it are mounted all the appliances for the manufacture of sugar. These were made by the Messrs. McOnie, of Glasgow, to the order of Messrs. Terris and Findlay, with the exception of some which were constructed in the workshops of the latter firm.

There are a good many central factories in Brazil, but there are few which unite all the qualities which are to be met with in this factory of *Pyranga*.

On a par with the surprising economy of labour and the startling saving of fuel, we note the extreme perfection of arrangement and working of all the appliances.

Let us commence with the crushing mill. This is Thomson and Black's patent five-roller system. The rolls are moved by a powerful engine, which also gives movement to the cane carrier and bagasse elevator, and the juice pump. Of the five cylinders, two act as defibrators, which do not possess the inconveniences of the Faure system. In spite of this being the first time the mill had worked, and its being a little stiff, the cane seemed perfectly crushed, and it showed that it was capable of crushing 78 tons of cane per day.

The bagasse, conducted by an elevator to a height of some metres above the ground, falls at the doors of the furnaces, which are fitted with Thomson and Black's patent for burning wet bagasse, and at the same moment is introduced into the furnaces, where it is perfectly burned.

We were present two days during the crushing season, and we noted that the bagasse *alone* was sufficient to keep the boilers at a pressure of 60lbs. while all the appliances were kept in full work. The boilers are multitubular, suspended, and constructed of steel plates, and are supplied with water by a pump for hot or cold water; the disposition of the steam traps and the hot-water tank is such, that the pump has not to draw the water, which is introduced by its own weight.

These steam traps, of the *syphonia* type, are continuous, and have not the inconvenience of leaving the condensed water to remain in the pipe until it accumulates sufficiently to open the escape valve by its own weight.

The juice, on leaving the mill, is pumped up to the juice heater, which works perfectly. This is supplied with a novel arrangement for lifting off the top for cleaning, and the same applies to the bottom part.

The juice, after leaving the juice heater, passes through a strainer, and is deposited into six subsidors or clarifiers, where it remains for some time.

The clarifiers are furnished with floats, so that the impure liquid is not allowed to pass, and the man in charge has not to occupy himself with seeing that impurities do not enter the *monte-jus*.

The same arrangement is found in the scum "blow-ups," of which there are four, and in the syrup subsidors.

The monte-jus, located below the tank, does not require a special workman to charge and discharge it. All the valves are provided with levers, allowing the juice to enter the eliminators, and only the workman in special charge of these is allowed to move them.

The cleaning-pans, or eliminators, were made at the workshops of Terris and Findlay, and leave nothing to be desired; these might be taken at first sight for appliances made by Messrs. Mc.Onie. They can be worked by either waste or direct steam. While speaking of this, we may add that all the appliances in the factory can also be worked in the same way.

From the eliminators the juice goes to the suction-tank of the *triple effet*, from which it is elevated by suction to the charging vessel of the same.

The *triple effet* has numerous modifications, and its working shows that these are improvements. One of the principal is the following. The vapour from the first vessel, instead of leaving the latter at the top and being conveyed in an uncovered pipe to the bottom of the second, thereby losing a great part of its heat by radiation and condensation, is introduced into a tube commencing at the upper part of the vessel, and descends inside the latter, and on leaving it enters at once at the bottom of the second vessel.

The communication between the second and the third vessels is effected in the same manner. On the small portion of the tube which is left uncovered there is a small steam cock which acts as an injector, and accelerates the passage of the vapour from one vessel to the other.

A fact which surprised us very much was the following :—The first vessel works with a vacuum of 20lbs., the second with 23lbs., and the third with 26lbs., and the juice is concentrated from its initial density to 25° Beaumé in 15 minutes.

The vacuum-pan has a capacity of four tons (4000 kilos.), is furnished with five serpentine coils, and has the man-hole at the side. Besides the steam and vacuum gauges, it is furnished with a differential gauge between steam and vacuum—a thalpotasometre.

Besides the syrup suction-tank, and two tanks for the *masse-cuite*, there are ten enormous crystalizing cisterns or cooling-tanks. These are made of cast-iron and of great solidity.

While we are speaking of these tanks, the following facts occur to us :—

Just now, when the sugar industry is in the midst of the present crisis, when all are proposing measures to alleviate this crisis, when the low quotations in the sugar market are discouraging many sugar factories, which have a guarantee of interest, to the point of causing many to enter into liquidation, it is well to admire and encourage those enterprising spirits, who not fearing this crisis, are applying their capital in enterprises of this nature.

Well, then, what do we find? In spite of a special act relieving from duty all machinery and appliances for the development of agriculture, and in spite of some of the appliances for this same Factory of Pyrauga having passed the Custom-House without paying duty,

notwithstanding this, these tank-plates, which had only to be screwed together to form tanks, had to pay £380 (\$3·800) in duties.

This requires no comment.

Let us continue—

The centrifugals are Mc.Onie's system, moved by a small steam engine attached to each, and the crystallised mass is broken up in a mixer, driven by a small Tangye engine, before entering the turbine. The sugar-dryer is one of Terris and Findlay's special type.

Besides the appliances for the manufacture of sugar from cane, there is also in connection with the Factory a complete Distillery for making rum.

The Factory is lighted at night by means of gas, and it is served by a small branch of the Leopoldina Railway, which runs wagons right into the cane house, after they have passed over a weigh-bridge which can weigh up to ten tons (10,000 kils.)

On the first day of this month (August, 1887), at the sound of the locomotive whistle, which gave the signal of the arrival of the train at the station of Pyragua, a second echo rent the air, and at the same time a large number of rockets were let off, and at the sound of the national hymn, played by the band, directed by the able master, Sebastiao Climaco, the *élite* of the Ponte Nova society disembarked from the train.

After the religious ceremony of *benção*, which was conducted by two vicars of the district, the inauguration took place, the machinery being put in motion and all the appliances put to work by Mr. Alexander Terris.

At 5 p.m. a sumptuous dinner was served, at which the partners of the factory exerted themselves to the utmost to entertain the invited guests.

After dinner the toasts of the health of the partners of the firm of Terris and Findlay were warmly and enthusiastically drunk by the large assembly of guests.

Amongst the other toasts, the various public and eminent men of the district were included.

At 8 p.m. the invited guests returned to the factory to admire the sparkling and pure colour of the sugar, which at this time was being taken from the centrifugals.

There were present during the construction of the house and erection of the machinery Mr. Alexander Terris, of the firm of Terris and Findlay, and a number of skilled workmen from the same house.

That the partners in the factory may be fortunate, and that we may soon see them rewarded for their sacrifices, is our earnest wish.

In conclusion, allow us to congratulate ourselves and this district that in a very short time we shall have established in our midst a workshop directed by such able professionals as Terris and Findlay.

Porte Nova (Minas Geraes, Brazil), 7 August, 1887.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., F.C.S., M.I.M.E.,
Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street,
Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

12596 and 12597. C. H. J. FRANZEN, London. *Process for manufacturing white, lump, or loaf sugar, directly from boiled refinery mass; also, process and apparatus for treating raw, clarified, or perfectly white sugar masses in loaf forms, by means of the centrifugal machine.* (Complete specification.) 16th September, 1887.

12834. N. ISCHERIKAWSKI, London. *An improved process of producing refined sugar from raw sugar.* 21st September, 1887.

13102. J. G. HUDSON, of the firm of Mirrlees, Watson & Co., Glasgow. *Improvements in sugar mills.* 28th September, 1887.

13196. W. P. THOMPSON & Co., Liverpool, London, and Manchester. (Communicated by Fritz Kleemann, Germany.) *Improvements in the purification of extracts or juices from fruits, roots, malt, and other vegetable matters, and of juices from maltose.* (Complete specification.) 29th September, 1887.

15607. T. WEBB, London. *Improved apparatus or appliances for and relating to cutting loaf sugar.* 7th October, 1887.

13643. WILLIAM HOSKIN, Halifax. *A new or improved treatment of lump sugar.* 8th October, 1887.

13839. ALFRED G. SALMON, London. *Improvements in the treatment of benzoyl sulphoric imide (commonly known as saccharine)* 12th October, 1887.

13955. S. FISKE, London. *Improvements in apparatus or devices for the treatment of sugar cane.* (Complete specification.) 14th October, 1887.

14009. W. P. THOMPSON & Co., Liverpool, London, and Man-

chester. Communicated from abroad by L. Bon Cuba.) *Improvements in machinery for cutting sugar cane.* 15th October, 1887.

ENGLISH.

ABRIDGMENT.

17041. R. CAMPBELL, of Glasgow, N.B. (Communicated from abroad by J. Foster, of Samarang, and J. Campbell, of Soerabaja, Java.) *Improvements in and connected with triple effet evaporating steam vacuum pans used for boiling sugar and for other evaporating purposes.* 29th December, 1886. This invention comprises various details in the construction and arrangement of valves, and valve chests and their branches, for leading off the steam from the sugar liquor in the pans of these triple effet, or multiple evaporating vessels, to their vacuum chests and air pumps, and also in the pipe fittings and their valves or taps for conveying the high pressure steam to the close steam-heating vessels of said pans, and for the drawing-off of the air and condensed water therefrom, which improvements the inventor estimates will add much to the effective action of the steam and vacuum in, and consequent evaporation by these pans; and also effect the isolation and separate working of any one, two, or more of these evaporating pans better than heretofore.

GERMAN.

ABRIDGMENTS.

32014. W. GREINER, Berlin. *Improvement in the apparatus for the condensation of vapours.* 25th October, 1884. The horizontal pistons and valves of a so-called dry air pump are rendered tight by water, which enters above the suction valves, and collects itself under the pump into a collecting box, from which a smaller water pump raises it. Air can be introduced along with the condensation water into the collecting box, as in the case of the so-called wet air pump, whilst the water and air are carried into the apparatus simultaneously.

32028. K. TROBACH, Berlin. *A process for removing sugar from molasses and other impure sugar solutions.* 27th January, 1885. The molasses are mixed with much saw-dust as is required to obtain an almost dry soft powder from which the sugar is extracted by means of alcohol. The substances that do not contain sugar, remain behind in the sawdust. To effect a preliminary washing, the molasses are mixed with alcohol and some sulphuric acid to precipitate the greatest part of the salts as sulphates. The inventor has

modified the process known as Marguerite, in this way he does not previously thicken the molasses to from 47 to 48 degrees Beaumé and add 85 per cent. of alcohol, but 50 to 60 per cent. of alcohol, and molasses at the usual degree of concentration so that the alcohol which is recuperated by distillation does not require any rectification prior to its being used again. Chamois leather is used to filter the dust fine or muddy deposits of sulphates; this sort of leather is not affected by liquids that are somewhat acid, and is easily cleaned by washing.

32132. E. SCHULZE, Amsterdam. *Cutting machine and a chopping machine for cane sugar.* 23rd November, 1884. Both machines are used to form slices for the diffusion process. The cutting machine cuts the cane into short pieces, the chopping machine on the contrary cuts it into long and thin strips. The cutting machine consists of a knife barrel formed of several parts, the knives of which are fixed by screws into the hollow spokes. On the upper part of this barrel there is a filling funnel. Below there is an opening provided with flanges, all round and through which the pieces cut off the cane are discharged. The chopping machine has a high annular filling funnel provided with numerous divisions of rectangular section which are filled up with pieces of cane sugar through several lateral doors on the outside and later on the filling up can be continued at the top.

32388. L. AUBERT and V. GIRAUD, Lyons. *A process for transforming starch and cellulose into cane sugar (saccharose), by application of an electric current.* 3rd December, 1884. The substances containing starch, flour, especially potatoes, are boiled first, as in the case of the preparation of starch, sugar with diluted sulphuric acid, and a little nitric acid, until the whole starch flour is dissolved. After this it is exposed during two hours to the electrical current produced by a dynamo of determined and regular strength. Under these circumstances the sugar is formed by the addition of one molecule of water to two of starch, or one molecule of starch to one molecule of glucose, or by separating one molecule of water from two molecules of glucose. The solution is neutralised with carbonate of lime, and boiled with a large excess of lime for the purpose of destroying the glucose and dextrine that might still exist, discoloured, with some basic sulphate of lead, filtered, saturated, thickened, and left to crystallise.

32234. A. RUSTENBACH, Schöningen, Brunswick. *Column apparatus for the evaporation of sugar juice and other liquids.* 23rd January, 1885. In a cylinder communicating with an air pump there are

numerous sieve diaphragms placed one above the other, and provided with a large central flanged opening, over which the liquid previously heated falls in the form of a shower on the large evaporating surfaces offered to it.

32671. S. VON EHRENSTEIN, Lduny. *Dry separation of beetroot and fruit juices with quicklime dust.* 18th December, 1884. The quicklime is not applied as usual as lime milk, or slaked in coarse pieces in the juice, but reduced to a fine powder or mill dust, so that it may be brought rapidly and in all parts in contact with the juice, thus lime is saved, and the disadvantage of lime in pieces which do not dissolve completely, and of the grit remaining, causing disorders in the lime pumps and juice valves, is avoided.

32614. H. HILLEBRAND, Hagen. *Supply plate for supporting the knives of beetroot cutting machine.* 16th December, 1884. The knives, which consist of a row of blades or cutters resting on plates provided with grooves, corresponding to the division and form of the knives. The knives are fixed on their seats by screws.

33342. H. SOMMER, Nieder-Schönfeld, near Bunzlau. *Turning four-sided knife shafts on beetroot cutting machines.* 14th April, 1885. These shafts are applied on those beetroot cutting machines in which two shafts provided with cutters are working opposite each other, and just under the bottom of a hopper, which bottom is made like a grate. One of the shafts turns to the right, the other to the left, when the double-edged knives provided with square opening are moved on the shaft.

32503. R. SCHUPP, Weferlingen. *Safety contrivance to avoid losses of juices in diffusion batteries.* 17th October, 1884. In order to avoid that when the evacuating valve is not yet closed, the juice valve should get opened, both valves are connected by an arm, which surrounds at one end the prolongation of the spindle of the evacuating valve, and provided at the other end with an eye surrounding the juice valve spindle. If the evacuating valve be open, the eye on the arm stands over the square end of the spindle, so that a crank cannot be placed on the square end.

33284. C. STEFFEN, Vienna, and R. RACJMACKERS, Tirlemont, Belgium. *Process for the extraction of white sugar from raw sugar filling masses.* 20th July, 1884. The systematic lixiviation is not effected with ready-made sugar as in the former patent, No. 31,486, dated 1st June, 1884, but directly with the filling mass, which is dried, for instance, by a current of air in barrels provided with steam

jackets and stirring appliances, then ground and cribbled. The pure sugar solution is replaced by water in the lixiviation. This water is introduced into and added to the oldest crystal pap present in the lixiviating apparatus, so that saturated sugar solution is being formed.

33334. F. NAPRAVIL, Swolenowes, Bohemia. *Improvement in apparatus for the production of sugar sticks.* 16th December, 1884. The mould plates of the sugar forms are plates of elastic material, having ribs on one side, which permit of the separation of the sugar sticks formed between the ribs by bending the plates. For the purpose of holding firmly the plates in the moulding boxes with inclined sides, edge ribs provided with springing end flaps are used. The said flaps act as wedges. The apparatus for emptying the mould plates consists of a table plate having an opening in which the mould plates, having their ribs turned downwards, are introduced, whilst a header, provided a convex face comes down, causes the bending of the mould plates, the ribs of which diverge radially and let the sugar sticks drop out.

33164. A. PACAS, Hatschein, near Olmutz. *Filling mass mixing machine for sugar moulds.* 8th April, 1885. This machine is used for mixing thoroughly and several times the upper surface of the filling mass which corresponds to the bottom of the loaf, after the said mass has been introduced in the mould. It is supported by a frame having the shape of a hoop, surrounding tightly the mould, and provided with inside teeth, the framing is provided with three radial arms on each of which a group of toothed wheels are connected with the teeth of the hoop; the frame sits on a central spindle. These smaller toothed wheels, are also provided with short spindles on which are fixed forked paddles. When the central spindle of the machine is set in rotation by means of its crank, the smaller wheels revolve on their axes and round the main central spindle,

33190. L. WULFF, Gadebusch. *Crystallising apparatus and process designed more especially for sugar manufacture.* 6th November, 1884. The purpose of this invention is to obtain by crystallisation in motion, not a fine powder of crystals, but isolated crystals of any size up to that of candy sugar crystals. The produced single sharpe edge crystals are easier to clean, and do not include so much lye as groups of crystals, and do not take on the separating impurities, so that good crystals can be obtained from impure unfiltered solution.

The completely saturated solution is mixed with a quantity of small crystals sufficient to reach the top surface of the solution. The same draw then to themselves, whilst the liquid is continually in motion, all the matter that precipitates, and thus gradually increase their own volume without any new individual crystals getting formed. The added crystals are heated in advance, up to the temperature of the solution, because, otherwise, the sudden cooling of the solution through cold crystals would have for result a dust of fine crystals, which would be very prejudicial to the formation of large crystals. Besides this, sugar crystals would become dull and cracked. In the manufacture of sugar, the crystals of addition can be employed in the vacuum boiler crystallising process, and in the cooling of clear boiled solutions, in which cases, the after products are chosen instead of pure crystal sugars, whilst, otherwise, these after products were used again in solution. In the apparatus for effecting the crystallisation in motion (of which a great number is described and illustrated), the crystals of addition are kept in suspension, or at least isolated one from the other when their size increases through the rotation of the apparatus or through stirring appliances. As driving motor for laboratories, paddle wheels rotating slowly can be employed, in manufactories, these can also be used, or the existing shafting. Rotary apparatus, which do not work continuously, can consist, for instance, of simple horizontal or oblique rotary cylinders provided with filling apertures; when the axes is oblique, the apparatus can also be constructed as vacuum for the simultaneous evaporation of the solution. To obtain continuous working, the horizontal apparatus for instance is divided into several chambers, lying one against the other. These chambers are connected through a central opening constituted by hollow shaft on which they revolve. The liquor passes into the chambers through this shafting, and cools gradually. An apparatus similar to the latter is a crystalliser composed of several chambers provided with stirring appliances, and having a hemispherical bottom and divided into several parts by vertical partitions, which are provided with communication holes arranged alternately at the top and bottom. Several apparatus having only one chamber placed in one row, and connected together such as for instance vacuum apparatus having steam jackets, curved stirring arms, and central communication holes can also be used. If it is wished to use the apparatus for the purpose of increasing impure crystals already

obtained, the above mentioned preparation of the solution can be accomplished also directly in the apparatus for instance in an upper dissolution compartment separated from the crystallising chamber by a sieving plate or gauze, and provided with a steam jacket. The solid substance passes from the upper dissolution chamber into the lower colder crystallising chamber, and during this travel is purified by dissolution and crystallisation in motion.

33677. M. MOLL, Berlin. *Application of a contrivance to centrifugals for the purpose of effecting a continuous removal of solid or pasty masses from the centrifugal drum.* 25th February, 1885. A vertical arm is provided with numerous rising oblique teeth. These push upwards the masses which through the centrifugal force cling to the sides, and throw them over the upper rim whilst the mass is fed from the bottom of the apparatus through a pipe into which the mass is forced.

33662. A. PASCHEN, Cöthen. *Pipe apparatus for taking samples of beet root sugar.* 1st May, 1885. The apparatus serves to take from large masses of beet root sugar, samples in the form of plug for the laboratories of those sugar factories which do not buy these masses according to the amount of sugar which has to be determined by polarization. A hollow boring rod guided through openings made in two brackets, and put in motion by means of a lever, carries at its forward end, two conical half opened sockets, which are placed one within another, and can be opened by shifting them on each other for the purpose of taking a sample out. The various plug samples already taken, are forced into the boring rod by those taken after. Arrived at the end of the tube, these plugs fall into a receptacle. When sample taking is stopped, those plugs which remain in the boring rod fall into the receptacle by turning the whole apparatus round a bolt provided for this purpose; a choking of the boring rod cannot occur as it is enlarged gradually somewhat in the shape of a cone towards the receptacle.

33666. E. DUERING, Itzehoe. *A machine for the cleaving of sugar discs.* 10th May, 1885. The sugar discs are brought by means of endless chains, provided with angular take-about pegs between the parallel blades of a sawing frame, which blades can be fixed high or low by means of a screw, and are provided on both sides with teeth. When a saw notch has been made in the sugar discs in one direction, these are turned 90 degrees, and another saw notch made. These

saw notches render easy the breaking of the sugar discs into the form of cube sugar.

33844. J. WOLFF, Jülich. *A process for the manufacture of lime sugar solution from molasses and hydrate of lime.* 20th April, 1884. 100 parts of molasses are mixed with a quantity of paste of lime sufficient to give a proportion of 48 to 55 parts of hydrate of lime to 100 parts of sugar. The mixture, which is in the beginning thin, becomes in the course of operation thick, to give it back its fluidity, as much water is added as is necessary. The solution thus prepared and containing $1\frac{1}{2}$ to 2 times its weight of water, is mixed with powdered caustic lime for the purpose of precipitating the sugar. The process is destined for the utilization of the large masses of hydrate of lime resulting in this process from the spontaneous decomposition of the precipitated sugar lime. This hydrate of lime constituted hitherto a very disagreeable bye-product.

40199. F. BAUDER, Boulogne-sur-Seine. *Machine for pressing perforated cubic sugar.* 24th December, 1886. This machine consists of a cover plate which can be shifted vertically, and causes the lifting (of the sugar) out of the mould; under this plate is another, provided with punches penetrating through the former. During the process of forming the sugar cubes a side cover is slid over it, and whilst the punches are rising another plate, provided with openings, is shifted over the sugar formed. The cubes issuing through these openings are shifted on the other side on a side plate, which partakes of the motion of the first cover plate.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, October 13th, 1887.

FAIR REFINING.	960/0 CENTFS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
Oct. 13, 1887.—4 15-16c.	5½c.	6 7-16c.	6c.	Jan. 1, 1887—102,279 tons.
Oct. 14, 1886.—4½c.	5 3-16c.	5 13-16c.	5¾c.	Jan. 1, 1886— 57,328 tons.
Oct. 15, 1885.—5 7-16c.	6¼c.	6½c.	6¼c.	Jan. 1, 1885— 89,186 tons.
Oct. 16, 1884.—4¾c.	5½c.	6¼c.	5¾c.	Jan. 1, 1884— 60,900 tons.
Oct. 18, 1883.—6¾c.	7 11-16c.	8½-11-16c	8¼c.	Jan. 1, 1883— 50,297 tons.
Oct. 19, 1882.—7¾c.	8c.	9¼c.	8¾c.	Jan. 1, 1882— 43,927 tons.
Oct. 20, 1881.—8½c.	8¾c.	10c.	9½-¾c.	Jan. 1, 1881— 66,999 tons.
Oct. 14, 1880.—7¾c.	8½c.	9½c.	9¼-¾c.	Jan. 1, 1880— 63,558 tons.
Oct. 16, 1879.—7 3-16c.	7 11-16c.	9¼c.	8¾-9c.	Jan. 1, 1879— 50,773 tons.
Oct. 17, 1878.—7¾c.	8¼c.	9¼c.	9c.	Jan. 1, 1878— 48,230 tons.
Oct. 18, 1877.—8½c.	8 15-16c.	10¼c.	9¾c.	Jan. 1, 1877— 25,885 tons.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO SEPTEMBER 30TH, 1886 AND 1887.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1886.	1887.	1886.	1887.
	Cwts.	Cwts.	£	£
Germany	3,953,529	4,749,653	2,456,529	2,603,416
Holland	227,914	319,133	145,411	172,434
Belgium	483,409	552,106	305,965	292,419
France	18,737	48,181	11,319	27,824
British West Indies & Guiana	1,657,435	1,923,932	1,304,814	1,349,723
British East Indies	649,527	453,277	334,863	207,246
China and Hong Kong	48,257	312	28,005	201
Mauritius	230,119	104,067	149,157	56,960
Spanish West India Islands	21,409	174,758	15,459	108,130
Brazil	440,758	646,074	292,353	342,462
Java	3,739,786	2,785,115	2,740,769	1,802,278
Philippine Islands	345,080	317,324	182,480	143,610
Peru	384,904	307,876	279,307	187,941
Other Countries	490,095	431,876	351,311	244,051
Total of Raw Sugars ..	12,690,959	12,813,684	8,597,742	7,538,695
Molasses	—	—	108,261	88,080
Total Raw Sugars	—	—	8,706,003	7,626,775
REFINED SUGARS.				
Germany	1,258,051	1,900,889	1,054,965	1,452,135
Holland	867,944	1,054,566	755,829	815,359
Belgium	81,792	150,617	75,491	124,336
France	459,637	1,114,395	411,164	836,785
United States	1,067,897	773,767	936,871	619,631
Other Countries	821,438	78,489	672,411	55,920
Total of Refined	4,556,759	5,072,723	3,906,731	3,904,166

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	114,776	86,839	77,983	46,869
Belgium	39,613	30,469	28,129	18,469
France	36,094	26,187	27,194	16,308
Portugal, Azores, & Madeira	67,818	65,406	48,932	38,304
Italy	98,886	67,437	69,179	42,657
British North America	13,606	20,974	10,757	14,612
Other Countries	285,750	231,212	219,424	157,965
Total	656,543	528,524	481,598	337,184

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of September compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1884, 1885, and 1886, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"LUMPS AND LOAVES."						"OTHER SORTS." Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.							
	Monthly Average.			Sept.	Sept.	Sept.	Monthly Average.			Sept.	Sept.	Sept.	Monthly Average.			Sept.	Sept.	Sept.		
	1884	1885	1886	1887	1885	1886	1887	1884	1885	1886	1887	1884	1885	1886	1887	1884	1885	1886	1887	
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	
France.....	2737	2035	1462	1429	457	644	1087	1621	546	2688	4760	198	1447	2363	4358	2581	4150	6189	3450	
Holland	3580	4247	3508	3717	2935	3820	2827	1948	1555	1428	2140	907	1325	2457	5528	5802	4936	5857	5284	
Germany & Austria ..	552	956	990	1457	281	851	617	2380	2859	6634	9102	839	4563	6377	2932	3315	7624	10559	6994	
Belgium	183	214	344	559	21	375	724	151	116	113	275	70	59	299	334	330	457	834	1023	
United States	962	722	854	599	1253	976	240	3386	10654	5078	3697	7642	5900	438	4348	11376	5932	4206	678	
Russia .....	..	..	..	3	..	..	..	..	..	3412	384	..	..	1155	..	..	3412	387	1155
Other Countries ....	..	..	..	..	1	4	..	121	12	9	..	..	..	..	121	12	9	..	4
Total	8014	8174	7158	7764	4948	6670	5495	9607	15742	19362	20358	9656	13294	13089	17621	23916	26520	28122	19964	18584

SUGAR STATISTICS—GREAT BRITAIN.

TO OCTOBER 22ND, 1887 AND 1886. IN THOUSANDS OF TONS, TO
THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1887.	1886.	1887.	1886.	1887.	1886.
London	55	80	252	262	231	252
Liverpool ..	85	90	216	206	224	198
Bristol	2	5	47	46	46	43
Clyde	36	37	187	192	187	163
<hr/>						
Total ..	178	212	702	706	688	656
<hr/>						
	Decrease.. 34		Decrease.. 4		Increase.. 32	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND. TO SEPTEMBER, 1887 AND 1886.

	STOCKS.		DELIVERIES.		IMPORTS.	
	September 1st.		In August.		In August.	
	1887.	1886.	1887.	1886.	1887.	1886.
New York	97	122	75	68	35	57
Boston	15	20	13	20	13	18
Philadelphia	1	5	10	14	10	13
Baltimore . . . . .	..	..	..	..	..	..
<hr/>						
Total	113	147	98	102	58	88
<hr/>						
	Decrease .. 34		Decrease .. 4		Decrease .. 30	
Total for the Year	—	—	925	881	936	970

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
30TH SEPTEMBER, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
179	93	25	37	42	17	393	502	626

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
30TH SEPTEMBER, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
1213	447	44	406	206	330	2646	2426	2698

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP,
OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1887-88.	1886-87.	1885-86.	1884-85.
	Tons.	Tons.	Tons.	Tons.
France.....	525,000 ..	488,299 ..	298,407 ..	308,410
German Empire ..	950,000 ..	997,962 ..	838,131 ..	1,154,817
Austro-Hungary..	425,000 ..	523,061 ..	377,032 ..	557,766
Russia and Poland.	400,000 ..	475,000 ..	537,860 ..	386,433
Belgium	100,000 ..	91,120 ..	48,421 ..	88,463
Holland and other Countries	50,000 ..	50,000 ..	37,500 ..	50,000
Total.....	2,450,000	2,625,442	2,137,351	2,545,889

This estimate for 1887-88, as compared with that given last month, shows a reduction of 100,000 tons, viz., 25,000 each France and Austro-Hungary, and 50,000 tons for Germany. As compared with Mr. Licht's first estimate (see page 335), the reduction is 150,000 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The market for raw and refined sugars has been growing in strength during the past month, closing with a firm feeling. Confidence in values is being restored. The present reduced stocks, with a certainty of lessened supplies, and increasing consumption, point—it may not be this year—to a more decidedly marked improvement later on.

The price of German beet 88% f.o.b. has advanced during the past month 7½d. per cwt. Cane kinds have also been very firm, and have gone up 6d. to 9d. per cwt.

The present position of the sugar market, especially for raw sugars, is healthier than has been the case for a long time. The imports of foreign refined have fallen off; the amount for September was less by 4000 tons than in August. Those from the United States have dwindled down to 678 tons.

The deliveries into the United Kingdom up to the 22nd October were 4,143 tons less than for the corresponding period of 1886, and the imports 31,442 tons more.

The stocks in the United Kingdom on 22nd October were 177,720 tons, against 211,933 in 1886, or a decrease of 34,203 tons.

Present quotations for the standard qualities, as under, are:—

FLOATING.		Last Month.
Porto Rico, fair to good Refining	12/6 to 13/- against	12/- to 12/6.
Cuba Centrifugals, 96% polarization	13/6 to 14/- „	13/3 to 13/6.
Cuba Muscovados, fair to good Refining..	12/6 to 13/- „	12/- to 12/6.
Java, No. 14 to 15, good to strong	14/6 to 15/- „	13/9 to 14/3.
LANDED.		Last Month.
Madras Cane Jaggery	9/3 to 9/9 against	9/- to 9/6.
Manilla Cebu and Ilo Ilo	9/- to 9/6 „	9/- to 9/6.
Paris Loaves, f.o.b.	15/6 to 15/9 „	15/3 to 15/6.
Titlers	17/9 „	17/6
Tate's Cubes.. .. .	20/- „	19/-
Austrian-German Beetroot, 88% f.o.b. ..	12/6 „	11/10½

THE SUGAR CANE.

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 The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to HENRY THORP, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see opposite the last page of each Number.

• The International Sugar Congress met for business on Monday, the 28th ultimo. The system of duties and drawbacks, in the countries represented at the Conference, and the bounties, which are or may be obtained, were got into. The statements made were ordered to be printed, and the sitting was adjourned for further deliberation.

The greater portion of the present number is devoted to reports of deputations and discussions on the foreign sugar bounties question.

In view of the meeting of the International Sugar Congress, which met the next day, three deputations waited upon Baron H. de Worms, November 23rd, with a statement of their case,—the first deputation was that of the British refiners; when Mr. Martineau read a memorandum (see page 632), setting forth the position of bounties now existing. France is the greatest sinner in the matter of bounties, but it is here shown how the French Government can put an end to them, and at the same time, meet the demands of her sugar manufacturers.

The second deputation was from the Workman's Anti-Bounty Association. Mr. Girdwood, the Vice-President, gave a plain, but very telling, statement of the numbers of sugar workers who had been thrown out of employment, and were penniless, through the ruinous effect of bounties. No one can read this unvarnished story without having his sympathies drawn out on behalf of this suffering class.

The third deputation was from the West India Committee. Mr. Neville Lubbock, in his able address, offered some practical suggestions. He said that the mere cessation of bounties would be useless; that what was required was, that there should be some security that the system of bounties would not again be resorted to.

Mr. Martineau at the British Refiners deputation, suggested to Baron Henry de Worms, that in the event of any technical difficulty arising in the Conference, that it should be adjourned until the next sitting and in the meantime the deputation would afford the British delegates every assistance in their power.

Nothing could be more gratifying than the replies which Baron de Worms made to these deputations, and if words are to be allowed their meaning, no stone will be left unturned by our representatives, in order to effect the object of the Conference.

On the 29th ult. Baron Henry de Worms, M.P., received a deputation from the Executive of the London Trades' Council in reference to the sugar bounties. Mr. George Shipton spoke on behalf of the Council, which he stated represented the only organized body of artisans and mechanics in the metropolis, having a constituency of over 26,000. By the operation of State bounties, labour was lost to more than 50,000 hands in this country. In seven trades immediately affected—the engineers, carpenters and joiners, steam engine makers, and blacksmiths—the effect of the bounties was severely felt. We regret that, for want of space, we cannot give a full report of Mr. Shipton's statement, and Baron De Worm's reply.

In the table which we give at page 655, showing the years working (1886-87) of a further list of German Sugar Companies, it will be seen that the differences are very striking. Whilst one Company declares a dividend of 33% and another 20%, there is one with a capital of £135,000 which only gives 5% upon preference shares and 2% on ordinary.

SORGHUM SUGAR.—Messrs. Willelt & Hamlin, in their circular, October 27th, say: "This culture seems to be gaining the foothold "which beet culture lost by reason of the large labour charges attend- "ing it here, as compared with Europe. It is not likely that beet

“culture will be renewed this side of the Rocky Mountains, or ever amount to much in California. Whether sorghum cane culture will get beyond experiments remains to be seen, but a committee of the Commercial Club, of Kansas City, Missouri, have reported favourably upon the experiments at Fort Scott, Kansas, and a stock company is to be formed for the establishment of refineries and sugar mills at Kansas City, and vicinity, to further develop the industry.”

The Editor of the *Chicago Journal of Commerce*, and a great believer in Dr. Collier, takes a much more sanguine view of the future of sorghum. He says that “the sorghum sugar industry, at this time, offers an opportunity for the investment of capital never before presented, and which we do not believe the people of America will ever again see. *We believe that every dollar judiciously invested in the sorghum sugar business, at this time, will double itself each year for the next ten years,*” and adds, further, that he has given the subject close, careful, and earnest consideration, and sincerely believes he has undisputable evidence of its truth.

We are pleased to learn that Mr. J. de Zimeno Cammack, who has an intimate knowledge of all matters connected with the sugar-growing, and sugar-making, and sugar markets in Cuba, and who has been a not infrequent contributor of papers which have appeared in *The Sugar Cane*, has accepted the editorship of the *Havana Weekly Report*. The reputation which this paper has long enjoyed will, we feel sure, be maintained, if not increased, under Mr. Cammack’s management.

Mr. John Davidson delivered a very instructive lecture last month on fruit-growing, before the Scottish Agricultural Society. Mr. Davidson estimates the money value of the annual consumption of fruit in Great Britain at £10,000,000, of which about £3,000,000’s worth is imported. Mr. Davidson thinks that a considerable portion of this £3,000,000 might be kept at home if as much attention was paid to fruit-growing as upon other branches of farming.

THE CUSTOM’S DUTY ON SUGAR IN VICTORIA.—On and after the 27th July, 1887, instead of the former duty of 3s. per cwt. on sugar, the following duties were to be levied: Sugar, the produce of the sugar cane, 3s. per cwt.; sugar, the produce of the sugar cane, bonded after the 27th July, and refined in Victoria in bond, 2s. per cwt.;

SUGAR, THE PRODUCE OF BEETROOT, and all other sugar, 6s. PER CWT.

A master of a ship writes to the *Liverpool Journal of Commerce*: "On loading my ship at Calcutta, I took on board 17,531 bags of "jagghery. The bags were tared at $4\frac{3}{4}$ lbs. each on average. On discharge the bags were emptied, and the tare again taken, when the "empty bags were found to be about $9\frac{1}{8}$ lbs. each. The receiver of "the cargo refuses to pay freight on the difference between $4\frac{3}{4}$ lbs. "and $9\frac{1}{8}$ lbs., thus deducting $29\frac{1}{2}$ tons from freight. Can he do this?" To which the editor adds the following note: "The sugar tare should "be paid. The increased weight of the bags was caused by the "saturation of the sugar, and, therefore, there would be less free "jagghery on which to fix freight. The saccharine was in the bags, "though not loose."

The Immigration Commissioner for the Argentine Republic (Dr. Navarre) in his report for 1886, gives, amongst other interesting information, the percentages of immigration according to nationalities. The Italians show 62·3; Spanish, 15·0; French, 7·2; British, 2·5; various 13·0. The Italians who find ready employment, are in Dr. Navarre's opinion the most useful. The Dr. is often troubled with "lawyers, newspaper editors, physicians, architects, book-keepers, schoolmasters, and others, in a destitute condition." These persons invariably bring letters of recommendation to the effect that they are of good families in Europe, and he finds "as a rule, letters of recommendation are the best guarantee that the bearer is good for nothing."

On the 1st July last, the Colonial Sugar Refining Co. and the Victoria Sugar Co., at Melbourne, amalgamated and became one concern. The former firm was started in 1854, and the latter in 1856. Up to the present year, the two firms were conducted as separate undertakings, but on a friendly footing with each other. The alterations which have lately taken place in the sugar market seemed to make a closer relation desirable, hence the union. The new company will retain the name of the older company, namely, "The Colonial Sugar Refining Company."

From want of space we have been compelled to hold over until January, several interesting papers.

INTERNATIONAL SUGAR CONGRESS.

DEPUTATIONS FROM THE BRITISH REFINERS, THE LONDON WORKMAN'S ANTI-SUGAR BOUNTY ASSOCIATION, AND THE WEST INDIA COMMITTEE.

BARON H. DE WORMS, as President of the International Conference on the question of sugar bounties, received several deputations on the subject at the Foreign Office, on November 23rd. The other British delegates, Mr. C. M. Kennedy and Mr. F. G. Walpole, accompanied the President; Messrs. Bateman and Farnell, as secretaries to the Conference, being also present.

BRITISH SUGAR REFINERS.

The first deputation, that of the sugar refiners, consisted of:—Mr. James Duncan, London; Mr. Abram Lyle, jun., London and Greenock; Mr. George Martineau, London; Mr. Alderman Cowan; Mr. T. B. Dakin; and Mr. C. J. Crosfield, Liverpool.

Mr. MARTINEAU read a memorandum drawn up by the British Sugar Refiners' Committee.* All the countries, with the exception of France, were now so weary of the constant drain on their revenue, that they were very much disposed to abandon the system if a general agreement could be come to, coupled with some security for the future, against the pernicious competition of sugar sold below cost price by means of State subsidies. The Committee urged that a countervailing duty would be conceived in the interests of free trade, and would restore the equality which the bounties had destroyed.

Mr. Alderman COWAN said before the system of bounties Continental Europe supplied 6 per cent. of the total percentage of imports; under the bounties it supplied nearly 60 per cent. The British Colonies, before the bounty system, supplied 63 per cent., and at the present moment the proportion had diminished to 14.

Baron H. DE WORMS, in reply, said—On behalf of my co-delegates and myself I need scarcely assure you that Her Majesty's Government are fully alive to the importance of the question which has been so clearly brought before us to-day. In fact, I need only point to the circumstance that Her Majesty's Government have convened this Conference to show how thoroughly alive they are, and how desirous they are to find practical measures to deal with this difficult question. I

* This we give *in extenso* at page 632.

have listened with great attention to the able report of Mr. Martineau on your behalf, and I must say that it has most fairly expressed and brought out, as far as I can judge, all the salient points of this knotty and vexed question. At the same time I need hardly say that you can scarcely expect that on the eve of a Conference which has to discuss, and discuss I hope in a practical manner, all the points, and seeing that I am entrusted by Lord Salisbury with the important and responsible position of president of that Conference, I shall go into any details or suggest to you any real practical form which that Conference is likely to adopt. I can only say this, that it will be, as it naturally ought to be, the duty of those who have been entrusted on behalf of Her Majesty's Government with this very important position, thoroughly to bear in mind that they have in hand the safeguarding of the interests of British trade. And I think, on the other hand, we may look to what I may consider a very valuable feature—the fact that whereas up to the present time very few Powers have taken the practical step of meeting us in Conference, at the present time we have Austro-Hungary, Belgium, Brazil, Denmark, France, Germany, Holland, Italy, Russia, Spain, and Sweden, all sending their delegates to London for the purpose of discussing, and, if possible, solving the point which we all have in view. I cannot say, of course, what line the delegates of those countries will take, any more than I am able now to foreshadow what may be the course which Her Majesty's Government may think fit to take; but this I can assure you, and repeat to you, that every question will be fairly and fully threshed out, and, as far as it lies in the power of Her Majesty's Government to do away with the system, which is unquestionably prejudicial not only to our home industry, but also to our colonies, that course will be adopted, and, we trust, adopted successfully.

Mr. MARTINEAU, in thanking Baron De Worms, suggested that if any technical difficulty should arise in the Conference, it should be adjourned till the next sitting, and in the meantime the deputation would afford the British representatives every assistance in their power.

The deputation then withdrew.

LONDON WORKMAN'S ANTI-SUGAR BOUNTY ASSOCIATION.

The second deputation consisted of a considerable number of working sugar refiners, whom Mr. Confuit, their secretary, introduced as

bonâ-fide workers, who were members of the London Workmen's Anti-Sugar Bounty Association.

Mr. D. GIRDWOOD, Vice-President of the Association, said: Baron De Worms and gentlemen, we will not attempt to take up your time with statistics and arguments, with which we feel sure you are much better informed than we can be; but we do feel grateful for the privilege of this interview, when we hope that due allowance will be made for the great anxiety and dread that fill our minds in regard to the future of ourselves and families. We witness with alarm the rapid decay of the industry in which we have spent our lives, and have grown old in, and therefore not eligible for other employment; we are here representing the remnant of what was once a vast industry of London, and of which only five factories now remain; we have seen with alarm and indignation, one after another of the refiners closing their gates all over the country, and their workmen sent adrift,—men who, from the previous nature of their calling, amidst intense heat, are nearly incapable of outdoor work; and we have seen them aged in a few months, and rendered desperate, by their futile attempts to obtain work elsewhere; we have with sadness seen their homes broken up and their families destitute, without food or education. These scenes we have to witness while trying to alleviate their sufferings by subscriptions, and which throws an additional burden on us; and we feel that what is their case to-day, may be our own soon. In the East of London, hospitals and other institutions have suffered from lack of subscriptions generously given by our employers and their workmen, and the whole of West Ham has been injured by the closing of James Duncan's works. Churches have suffered severely, for every one was benefitted by his philanthropy, and now these congregations are scattered in search of work.

We consider we have been robbed of our livelihood; and we ask ourselves should this state of matters continue? Should all this capital and labour, both at home and in our colonies, be thus wasted in order that foreign industry be developed, and our consumers bribed by the present artificial cheapness of sugar, and which will only be of a temporary character until they obtain a monopoly of the British market? And we ask ourselves, have we not some claim on our Government? Are British and Colonial interests to be thus at the mercy of foreign exchequers? We see Germany, Austria, and France competing for the possession of our markets, with ever increasing sub-

sidies to their refiners, who have only to ask their Governments for an increase to enable them to handicap each other in order to obtain possession of our markets, and we find in every case their Governments grant the prayer of their refiners. This present year Germany has given an increase on refined sugars; whilst we have been met by previous Governments with the (*non posumus*) arguments that free trade and our commercial treaties will not admit of any redress.

Sir, we feel that if several other important industries were to be simultaneously attacked, that it would be considered by the country as a national calamity, worse for this country than a disastrous war, and that such a storm of indignation would be raised that we should not hear from men, worthy the name of statesmen, any more of this (*non posumus*) argument. Sir, we contend, and we have high authority on our side, that the blessing of free trade is being abused in this matter, and that if such commercial treaties exist, they should at once be altered, and that this pernicious system of bounties and concealed subsidies, which is injurious to Great Britain, to our colonies, and to the consumer, not only of our own country, but also to the consumers of those countries giving bounties, should cease, and that we should have what is dear to every Briton—FAIR PLAY. We ask for no subsidies, nor for any protective duties; but we hold that the remedy is that a countervailing duty, equal to the bounties given by these countries, and not a fraction more, should be imposed, and thus place all on a natural footing. This will test whether the British refiner can hold his own with the foreign refiner in the necessary skill and science required in the refining of sugar. We would not seek to keep the foreigners from our markets if they can produce sugar cheaper than we ourselves. Sir, great expectations and hopes have been raised in regard to this Conference, and the feeling exists that our Government will now act decisively, and that either these bounties must cease or a countervailing duty be imposed. We trust, Sir, that British workmen will no longer be thus robbed of their labour, which is all the capital we have. We pray that we may not be compelled to swell the already too numerous pauper class; we entreat our Government by its representatives at the approaching Conference to uphold British interests, and no longer to tolerate the continuance of this pernicious and unjust system.

Baron DE WORMS, in reply, said—I am sure that in the name of my colleagues, the other delegates to the conference, as well as my

own, I can assure you that we have been very much impressed by the eloquence of the facts which you have laid before us. You have told us how a very prosperous industry has, in your interpretation, by means of foreign bounties, been reduced to a low and a very disastrous state, and you have pictured in very true words the misery attendant upon the decline of that industry. I think that I cannot give you better proof than the assembling of this conference that the Government are perfectly alive to the facts which you have laid before me and before my co-delegates. The initiative of calling together this conference was that of her Majesty's Government, because they hoped, and they still hope, to find some means by which this bounty system may be abolished, and the British trade may, in consequence, revive. Of course I need not say that it is not in my power, nor would you expect me as president of this conference, to enter into the details of the policy which it may be necessary for her Majesty's Government to adopt. I think we may rest assured, and find some consolation in the fact, that foreign countries themselves are also alive to the inconveniences growing out of the bounty system. If that were not so we should not have, as we now have, so large a meeting of the various powers who give bounties coming together as they will do to-morrow in England for the purpose, the practical purpose I trust, of endeavouring amicably to solve this international difficulty. I merely point out to you, as it will afford to you the same consolation as it does to me, that all the Powers are imbued with the wish, if possible, to solve this question. How that question is to be solved it is not for me to suggest. All that I can say is, as far as I am concerned, and I assume that I can speak in the name of my colleagues, who are gentlemen of the very greatest experience. Mr. Kennedy, of the Foreign Office, knows as much as anybody about the question; Mr. Walpole is also very well known to you from the practical interest and knowledge that he has of the question; and another gentleman from the Colonial Office will add his experience to theirs, and I trust that our collective efforts may be productive of the result which you wish, and which, I believe, may possibly be attained.

In reply to Mr. WALPOLE,

Mr. GIRDWOOD said that in the course of the past twelve months 2,000 sugar refiners had been thrown out of employment in the East-end of London, and the work was of such a peculiar character that they could not follow out-door occupations.

The deputation then withdrew.

WEST INDIA COMMITTEE.

The third Deputation consisted of Mr. Neville Lubbock, Chairman of the West India Committee; Mr. Quintin Hogg, Deputy Chairman; Sir George H. Chambers, Mr. W. M. Campbell, Mr. R. M. Harvey, Sir John Hanham, Mr. W. P. B. Shephard, and Mr. James L. Ohlson, Secretary.

MR. NEVILLE LUBBOCK: Baron de Worms,—I think my first duty is to apologise to you for the fact of our not being able to attend this morning at two o'clock, as you originally invited us, and to express a hope that the change of time has not been inconvenient to you.

Now, Sir, with regard to this Conference which is about to meet, the first remark I have to make is that we have never yet been definitely informed what the object of the Conference is. We have been invited to come here to-day,—I think the expression used was—to express to you our views on the sugar question; but we should, I must say, like to be definitely informed what the object of the Conference is. We should very much like to have seen the terms of the invitation which was sent to the foreign Governments, because we think that something may possibly turn upon the manner in which the invitation was communicated to those Governments.

But, Sir, I presume that we may go so far as to assume that the object of the Conference probably is to endeavour to bring about a cessation of the bounty system on sugar. If that is so, I would now venture to make a few remarks as to what in our opinion would be the most probable means of getting the bounty system put an end to, and what means would in our opinion be absolutely useless for the purpose.

Before dealing with the subject of the cessation of the bounties, however, I would remark that the cessation of the bounties alone would be quite useless; that what we require is not only the cessation of the bounties, but some security that the bounty system will not again be resorted to. (Hear, hear.) It is quite obvious, Sir, to you—I am sure that as a man of business you will at once see—that capitalists cannot be induced to embark money in an industry unless they have some security that that industry is not open to be attacked by such a system as this of the bounties. No one can judge of what the price of an article is going to be in the future if that price is to be regulated by bounties and not by the cost of production.

Now, Sir, assuming that it is the desire and the object of Her

Majesty's Government to get rid of these bounties, and that the object of the Conference is to bring about that result, there are two ways which have been suggested of bringing it about. Several gentlemen have often said to me, "your proper course is to endeavour to persuade the foreign Governments that it is excessively foolish on their part to waste their taxpayers money in giving bonuses to their sugar manufacturers and sugar producers." I cannot help thinking that possibly those gentlemen rather view the matter from an academical, than from a practical point of view. I cannot myself think that it would be of the slightest use for anybody on behalf of Her Majesty's Government to endeavour to lecture foreign Governments as to what it is wise or unwise of them to do in regard to the taxation of their own people. I feel quite convinced, Sir, that if the line which Her Majesty's Government propose to take is merely to invite these foreign Governments to a Conference in order to receive from you, Sir,—which I am sure they would do in the most able manner possible—a lecture on the subject of Political Economy; that the object of this Conference will be perfectly futile, and that it will end as previous Conferences have done hitherto. (Hear, hear).

But, Sir, there is another course which may be pursued, and it is a course which I think has been very distinctly indicated by Lord Salisbury in one or two speeches that he has made to deputations that have waited upon him.

"It is quite obvious to anybody who is thoroughly acquainted with this question that the English Government have the matter in their own hands; of course, when I say the English Government, I mean the English Parliament, because the English Government cannot deal with this question unless they have the support of Parliament behind them." The foreign Governments know perfectly well that, if we choose, we could put an end to this system in a few months. I am inclined, therefore, to think, Sir, that the wise course would be for Her Majesty's Government to point out to Foreign Governments how extremely reluctant they would be, how extremely reluctant we should all be, to see any necessity for taking any action which should have even the appearance of hostility against these Foreign Governments. But, Sir, there is no mistaking the fact that public opinion is ripening very rapidly on this question. The trades' unions, themselves, have spoken out on the subject. The working classes feel that these bounties are distinctly unfair. They also, I think, have now arrived at the con-

clusion that these bounties are distinctly injurious to their interests. Therefore, whatever the views and the wishes of Her Majesty's Government may be, it is quite possible, that before long, their hands may be forced in this matter.

Now, Sir, I do not think that it will be necessary to do more than indicate, in the most judicious, gentle manner possible—to these foreign Governments that in point of fact the power of dealing with this question does rest in the hands of Great Britain, and in the hands of Great Britain alone, I think that if that were done it would probably turn out that those foreign Governments—some of whom no doubt have acted under pressure—would be very glad of the opportunity of getting rid of their bounties. And I think it is quite probable that if Her Majesty's Government would express their willingness to join in a Convention under which every one of the powers should agree to abolish their bounties, that might lead to a practical solution of the question. But, Sir, if there is to be a Convention, it must be perfectly obvious that no foreign Government will agree to tie their hands and be bound in this matter by a Convention to this country, if by so doing they are to incur the risk of seeing their own industries placed in a worse position upon English markets than they would be if no such Convention existed. I think it must be obvious that if the English Government invites these foreign Governments to make a Convention with her, she is in duty bound to secure to them that they shall not be in a worse position upon the English markets than they would be if no such Convention were made. (Hear, hear.)

There is one other point to which I should wish to allude, and that is the question of the favoured nation clause in our treaties. Perhaps Mr. Kennedy could inform us whether, for instance, we have a treaty with the favoured nation clause with Spain.

MR. KENNEDY: Yes.

MR. NEVILE LUBBOCK: I have instanced Spain because Spain has got a very good case in this matter. Let me suppose, Sir, that Spain were to come to Her Majesty's Government, and were to say: "You have granted us the most-favoured nation clause; and the object of the most-favoured nation clause is that the commodities produced by different foreign countries shall be upon a position of equality upon the English markets." That, Sir, is, I think, beyond all gainsaying the clear and undoubted object of the favoured nation clause.

Now, what is the case with Spanish sugar? When Spanish sugar comes to London, it is met practically by a duty, that is to say, it is no longer on an equality with German sugar. German sugar comes here with a bounty of £2; Spanish sugar comes here with no bounty at all. The result is exactly the same as if Her Majesty's Government levied a duty of £2 per ton upon Spanish sugar. I venture to think that if that question were raised by Spain, it would be a very difficult question for Her Majesty's Government to meet. Therefore, I would suggest that it is very desirable, if possible, that some agreement should be come to by all these different foreign Governments as to the construction of the favoured nation clause. It appears to me perfectly obvious that the favoured nation clause was never intended, and could never have been intended to apply to bounty-fed goods; but it may be desirable that that should be clearly laid down as the view of Her Majesty's Government, and I venture to think that it would, in all probability, receive the assent of the different European countries. It is so manifestly just, and it is so obviously the intention of the favoured nation clause, that I can hardly believe otherwise.

We hope, Sir, that you will be able to give us some assurance that Her Majesty's Government are distinctly in earnest in this matter, and that you have some reason to hope that the result of this Conference may be, as I said before, not only the cessation of the bounties, but some security that we shall not again be subject to their being re-imposed (hear, hear).

MR. QUINTIN HOGG said the conference was being regarded with very grave interests in the colonies. The bounties were destructive of free trade, for the sugar produced in our colonies was, in consequence, driven out of our markets into America, where the colonists bought in return the stores and other materials which they might otherwise have bought in this country.

MR. NEVILLE LUBBOCK: You were good enough to ask us for a Memorial, but we really have not had time to prepare one as yet, but we hope to be able to do so very shortly, and send it in. There has been a Memorial sent in from the Anti-Bounty Association, and the West India Committee do form practically a portion of that Association, and the views expressed by that Association are very much on the same lines as those that will be expressed by the West India Committee.

BARON HENRY DE WORMS, in reply, said,—I have listened with the greatest possible attention to the remarks that you have made. I think, perhaps, it would be better for me to answer, in the first instance, the question that you put to me as to the nature of the proceedings of this conference. You said that you assumed that the conference was to meet to endeavour to put an end to the bounty system. That clearly expresses the object we hope the conference will attain. (Hear, hear.) With that object the conference was convened. Of course, it would be impossible for me to predict that it will be successful; but, at all events, that is the object for which the conference meets. You further asked whether the conference, supposing the result to be successful, would bear in mind that the bounties should cease entirely, and should not be liable to recurrence. As far as we know, should the conference prove successful, in abolishing the bounty system, it will naturally be the endeavour of the delegates of the Government to make that a permanent and not a temporary cessation. (Hear, hear.) Then, again, if I understand correctly, you said that there had been no successful conferences on this question. I would like to point out that there has been no conference on the question as now put, the conferences of 1864 and others being only on the refining question, and the correlation of raw and refined sugar. This present conference raises the whole question of the sugar bounties. As far as the West Indies are concerned, the raw sugar bounties are of the chief importance. Therefore, I think that, as regards your position in representing the West Indian colonies, you may assume that this conference meets under particularly favourable circumstances. You have pointed out several ways in which you think the question should be practically solved. You would hardly expect me, in my position as president of the conference, to go into all those questions in detail, or to bind the Government at the present moment to any particular line of policy. All I would point out is this—that the Government took the initiative in calling this conference together, and therefore you may reasonably assume that their object was, what it really is, to solve, if possible, this very important question, which affects not only our home, but our colonial industry. That being the case, I need scarcely assure you, as far as my colleagues and myself are concerned, we shall do everything in our power to bring this question to a successful conclusion; and you may

take some consolation from the fact that the Powers, who up to the present time have never before attended a conference on this question, are attending it now for the first time, and that you have a larger number of Powers attending this conference than on any previous occasion. As reasonable men, you may assume that their intention is not to come to England for the mere purpose, perhaps, of enjoying the November fogs, but of trying, if possible, to agree with Her Majesty's Government upon some joint plan of action, which, while not materially affecting or injuring their own home industry, shall not press unfairly upon the sugar industry in this country or in our West Indian dominions. As far as the Government are concerned, I think you will admit that they are thoroughly alive to the importance of the question as regards the West Indies, inasmuch as they have now joined to the delegates of the conference a member of the Government representing the Colonial Office, so that the colonial interests shall be equally represented with the other interests of the country at large. With regard to the general system to be pursued or the vexed question as to how far the favoured-nation clause may interfere with their arrangements, I do not think you would wish me to go into those very abstruse questions now. They may possibly arise at the conference, and then I think you may rely that, with the very excellent co-delegates I have representing the Foreign Office (in the person of Mr. Kennedy), the Customs (in the person of Mr. Walpole), and the Colonial Office (in the person of Lord Onslow), your interests will be in perfectly safe hands, and that Her Majesty's Government go to the conference with the avowed wish and intention, if possible, of solving once and for ever the bounty question.

Mr. NEVILLE LUBBOCK: I think it only remains for me to thank you very sincerely for the remarks which you have made, which certainly gives us some very good hopes. We are quite aware, Sir, that in your position, we could not expect you to tell us all that you propose to do in the conference; but we thought at the same time that you would excuse us if we spoke out more frankly to you than your position would enable you to do to us. We beg again to thank you for your kind reception.

The deputation then withdrew.

* The British and Colonial Anti-Bounty Association have addressed a letter to Baron Henry de Worms, which we give at page 635.

MEMORANDUM DRAWN UP BY THE BRITISH SUGAR
REFINERS' COMMITTEE,

*At the request of the British Delegates to the International Conference
on Sugar Bounties, held in London, in November, 1887.*

We do not consider it necessary now, as it has been on former occasions, to furnish detailed proofs of the existence and approximate amount of the bounties, because ample evidence has in recent years been furnished in the foreign countries themselves on these points. In France, for instance, a new law was passed in 1884, avowedly for the purpose of giving a bounty which might enable the French manufacturers to compete with their more favoured rivals in Germany and Austria. The French official reports and speeches at that time, and in the subsequent parliamentary discussions, not only declare the fact of there being a large bounty under the new law of 1884, but even furnish us with its amount. The recent debates in the German Reichstag have, in the same way, thrown a flood of light on the amount of bounty given in that country. As to Austria, all difficulty has been removed in the new bill just brought in by the Government, which openly gives a definite bounty on every ton of sugar exported. Russia, in 1885, adopted the same straightforward system. The Government of the United States have at last admitted that their drawback on the export of refined sugar gives a bounty, and have reduced it, with the proviso that it may be necessary to make a still further reduction before entirely abolishing the bounty.

Unfortunately this now fully admitted fact that the bounties exist is accompanied by another fact that they are far more formidable and wide-spread than when the last Conference met in 1877. At that time the sugar refiners seized every opportunity of pointing out that if the system of giving bounties were not speedily stopped it would grow to very alarming dimensions. This forecast has been fully verified. At that time loaf sugar was the kind most seriously affected. But now, as we predicted, the system has spread to crystallized and granulated sugars. It has also spread in extent. France, Germany, and Austria now export enormous quantities of that kind of sugar, all of which receives a bounty. The United States did the same till quite recently, and Russia last year and the year before flooded foreign markets with her surplus stock by means of a bounty which, while it lasted, was one of the largest we have ever experienced.

On the other hand, there is a favourable feature among the changes which have taken place since the Conference of 1877. All the countries, with the exception of France, are now so weary of the constant drain on their revenue that they are very much disposed to abandon the system, if a general agreement can be come to, coupled with some security for the future against the pernicious competition of sugar sold below cost price by means of State subsidies. It is true that France also is feeling the heavy loss to her Exchequer, and has already taken steps to limit it; but there is a great outcry among her manufacturers, who declare, with much candour, that they have been outstripped in the race by the Germans, with whom they admit they cannot compete even on equal terms. With cane sugar, also, they loudly proclaim that they cannot compete without a bounty. These admissions are of course most valuable to those who oppose bounties.

It would seem, however, that the demands of the manufacturers can be met without retaining the bounty, and without any continuance of the present heavy drain on the French Exchequer. The manufacturers declare that they cannot live without protection. If the French Government desires to satisfy them, it can be easily done without any loss to the revenue, with no further loss to the home taxpayer than what he now incurs, and with ample profit to the producer. At present the French manufacturer has no protection in his own market. It is true that there is a heavy surtax on sugar imported from European countries, but there is none on sugar imported from foreign countries outside Europe. If the surtax were extended so as to make the wall complete, the French manufacturer would always command an additional price equivalent to that surtax, so long as he refrained from producing more than was required for home consumption, and it is manifest that a moderate trade at a high price would be more profitable to him than an exaggerated trade at an artificially low price. We throw out this suggestion as a way out of the French difficulty, not because we advocate protection, but because the French Government are evidently determined to protect their sugar industry, and this is the only way in which that can be accomplished, together with a restoration of the revenue to its proper amount, and less injury to the taxpayer than under the present system.

If France were to agree to adopt this method of allaying the fears of her manufacturers she might safely join with the other countries in abolishing all drawbacks on the exportation of sugar by the universal adoption of the system of manufacturing and refining in

bond. That this is practicable has been fully proved by France herself, where, up to 1884, all the beetroot factories were "in bond," that is, worked under excise supervision, no duty being paid on the sugar until it left the factory. The French manufacturers gave evidence before the Conseil Supérieur in 1872, and again before the Select Committee of the House of Commons in 1879, to the effect that the system worked admirably, being no hindrance to the manufacturer, and a perfect protection to the revenue. Germany is now about to adopt the system, while retaining a remnant of the old *régime*; and Austria, if the Bill now before her legislative assembly passes into law, will establish a pure system of working in bond, and therefore paying no drawback on exportation; but until other countries abolish bounties in the same way, she proposes to pay a direct bounty, premium, or subsidy to all exporters of sugar. The position of matters is therefore ripe for the general adoption of the system which, by the abolition of drawbacks, gets rid of all the bounties which arise from them.

The only fear is that the influence of the sugar manufacturers in France may be too strong to admit of the French Government consenting to an immediate and complete cessation of bounties. In that case the other countries would undoubtedly ask for some security that they should not, if they abolished their bounties, be met by French bounty-fed competition on British markets, and such security could only be given by the British Government undertaking to remove the bounty and restore equality of competition by means of a countervailing duty. We have already, in our letter to Lord Salisbury of the 18th of August, stated the reasons why such a duty, which, be it remembered, is a duty on bounties not on sugar, would be, to use the words of the *Spectator*, not only consistent with free trade, but positively conceived in the interests of free trade. That it would not contravene the most-favoured-nation article in our commercial treaties has been shown with much force in a paper drawn up by Mr. W. P. B. Sheppard, Barrister-at-Law, which will be communicated to you by the West India Committee. In fact, it is the bounties which nullify the intention of that clause, and, therefore, the countervailing of them would restore the equality which the bounties have destroyed, and which the clause demands.

We have stated what we believe to be the present position of the question, and we sincerely hope that your efforts to bring about an agreement may be crowned with success.—For the Committee,

GEORGE MARTINEAU, Hon. Sec.

21, Mincing Lane, 23rd November, 1887.

BRITISH AND COLONIAL ANTI-BOUNTY ASSOCIATION.

The following letter has been addressed to the Baron HENRY DE WORMS, President of the International Conference on Sugar Bounties:—

51, Lime Street, London, E.C.,

22nd November, 1887.

Sir,—I am desired by the British and Colonial Anti-Bounty Association, representing upon this question the views of the colonial sugar planting and refining and British sugar refining industries, to inform you that it is the unanimous opinion of this Association, that the abolition of the drawback system, by the general introduction of manufacturing and refining in bond, is the only security for the cessation of export bounties.

I beg to remind you that this view is in strict accordance with the recommendation of the Select Committee on Sugar Industries of 1879–80; and it had previously been agreed to by France and Holland as the result of negotiations in 1874–5.

We presume that the object of the Conference is to secure the entire cessation of bounties, and that Her Majesty's Government are now convinced that this system is injurious to British home and colonial interests, and that its entire suppression is a desirable object to attain. And seeing that this system, instead of diminishing, has now extended to enormous proportions, and that the time has arrived for decisive action to be taken in the interest of British industries, it may be taken for granted that every endeavour will be made by Her Majesty's Government to secure, once for all, a settlement of the question. This settlement could be best arrived at by manufacturing and refining in bond, and thus secure the duties being charged upon the finished article as it goes into home consumption and obviate all duties, and, therefore, drawbacks upon export.

We regard the granting of bounties, as, to all intents and purposes, a breach of the favoured-nation clause, and we think that it should be put before the Conference that produce exported under bounty should be exempted from the privilege of that clause. In order to make this clear, we beg to call your attention to the enclosed memorandum, drawn up by Mr. Shephard, Barrister-at-Law, of Lincoln's Inn.

And further, we would suggest that Her Majesty's Government

cannot expect that any convention, abolishing bounties, will be effective, unless it contains a clause providing for a legislative security on the part of Great Britain against the resumption of the bounty system by any contracting power, or the continuance of that system by any non-contracting power. It is not probable that any country will abolish its bounty system, if by so doing, it is placed at a disadvantage in British markets as compared with other countries. We trust both for the British interests we represent, and for the just satisfaction of foreign countries who, at the desire of Her Majesty's Government, take measures for abolishing their bounties, that Her Majesty's Government will obtain the necessary security both against the continuance of unequal competition, and the revival of the bounty system when once abolished, once for all secure that in respect to the sugar industry, free trade principles shall be restored and maintained.

Signed, N. LUBBOCK, Chairman.

INTERNATIONAL SUGAR CONGRESS.

LIST OF FOREIGN DELEGATES.

Austria-Hungary	..	Count Kuefftein.
Belgium	.. ..	M. Guillaume, M. du Jardin, and M. de Smett.
Brazil	.. ..	Don Pedro Lemo and M. Fernandes Penheiro.
Denmark	.. ..	M. Lange.
France	.. ..	M. Sans Leroy, Count de Florian, M. Pallain, M. Catusse, M. Legros, and M. Broizard.
Germany	.. ..	M. Jordan and M. Jehnigen.
Italy	.. ..	M. Catalini (<i>Chargé d'Affaires</i>).
Netherlands	.. ..	M. de Pistorius, M. B. Reiger, M. G. Eschanzier, and M. C van den Ven.
Russia	.. ..	M. Kamensky.
Spain	.. ..	M. Batenero and M. de Lome.

Baron Henry de Worms, M.P., President.

Count Kuefftein, Vice-President.

Mr. H. Farnall, Foreign Office,	}	Secretaries.
Mr. E. A. Bateman, Board of Trade,		
M. Broizard, French Delegate,		
Mr. E. Crowe, Foreign Office,	}	Assistant Secretaries and Attachés.
Mr. C. A. Harris, Colonial Office,		
Mr. W. D. Lawrence, Board of Trade,		
Mr. E. Gosse, Board of Trade,		
Mr. W. A. C. Law, Foreign Office,		

COLONIAL CONFERENCE, 1887.

DEPUTATION ON THE FOREIGN SUGAR BOUNTIES.

Two bulky blue books, comprising nearly 1,000 pages, giving a report of the Proceedings of this Conference, which was held in London in April last, have been published.

On the 29th of April, a deputation on the sugar bounties, consisting of:—

Mr. Neville Lubbock, Chairman of the West India Committee ;
 Sir George Chambers, Windward Islands ;
 Sir A. Adderley, K.C.M.G., Bahamas ;
 Mr. J. Ernest Tinne (Chairman, West India Association, Liverpool), British Guiana ;
 Mr. R. Hankey, Leeward Islands ;
 Mr. A. P. Marryat, Trinidad ;
 Mr. C. Washington Eves, Jamaica ;
 Mr. Ohlson, Secretary, West India Committee ;
 Sir Henry Barkly, G.C.M.G., Mauritius ;
 Mr. Henry J. Jourdain, C.M.G., ditto ;
 Mr. W. Newton, ditto ; and
 Mr. J. Mason, C.M.G., Fiji ;

waited upon the delegates, and others comprising the Conference, which consisted of the following:—

The Right Hon Sir Henry T. Holland, Bart., G.C.M.G., Secretary of State for the Colonies. President.

The Right Hon. the Lord Stanley of Preston, G.C.B., President of the Board of Trade.

The Right Hon. the Earl of Onslow, Under-Secretary of State for the Colonies.

Mr. Edward Wingfield, Assistant Under-Secretary for the Colonies.

The Right Hon. Sir James Fergusson, Bart., G.C.S.I., M.P., Under-Secretary of State for Foreign Affairs.

The Right Hon. Anthony J. Mundella, M.P.

Baron Henry de Worms, M.P., Secretary of the Board of Trade.

Mr. C. B. Stuart-Wortley, M.P., Under-Secretary of State for the Home Department.

Mr. Robert Giffen, LL.D., } Assistant Secretaries, Board of Trade.
 Mr. Courtenay Boyle, C.B., }

Mr. J. H. Bergne, C.M.G., Superintendent of the Treaty Department of the Foreign Office.

REPRESENTATIVES:—

Newfoundland:—

Sir Robert Thorburn, K.C.M.G., Premier.

Sir Ambrose Shea, K.C.M.G.

Canada :—

Sir Alexander Campbell, K.C.M.G., Lieutenant Governor of Ontario.

Mr. Sanford Fleming, C.M.G.

New South Wales :—

Sir Patrick Jennings, K.C.M.G., late Premier.

Sir Robert Wisdom, K.C.M.G., formerly Attorney-General.

Tasmania :—

Mr. John Stockell Dodds, late Attorney-General.

Mr. Adye Douglas, Agent-General.

Cape of Good Hope :—

Sir Thomas-Upington, K.C.M.G., Attorney-General.

Mr. Jan Hendrick Hofmeyr.

Sir Charles Mills, K.C.M.G., C.B., Agent-General.

South Australia :—

Sir John William Downer, K.C.M.G., C.B., Premier.

New Zealand :—

Sir Francis Dillon Bell, K.C.M.G., C.B., Agent-General.

Sir William Fitzherbert, K.C.M.G., Speaker of the Legislative Council.

Victoria :—

Mr. Alfred Deakin, Chief Secretary.

Sir James Lorimer, K.C.M.G., Minister of Defence.

Mr. James Service, late Premier.

Queensland :—

Sir Samuel Griffith, K.C.M.G., Q.C., Premier.

Sir James Garrick, K.C.M.G., Q.C., Agent-General.

Western Australia :—

Mr. John Forrest, C.M.G., Commissioner of Crown Lands.

Mr. Septimus Burt.

Natal :—

Mr. John Robinson.

Mr. W. A. Bailie-Hamilton, Secretary to the Conference.

At the request of the President, Mr. Lubbock read a paper, giving succinctly some of the more important features of the question; which was followed by an interesting discussion, in which Mr. Jourdain, Mr. Tinne, Mr. C. Washington Eves, and others took part—which we give *in extenso*—together with a statement of Sir James Fergusson, Under Secretary of State for Foreign Affairs, and at one time (1868) Governor of South Australia, and in 1873 Governor of New Zealand.

We regret that our space will not admit of our giving the report of the discussion which followed in the Conference after the deputation withdrew.

PAPER BY MR. NEVILLE LUBBOCK.

Sir Henry Holland, in the first place I should like, on behalf of our West Indian Colonies, to thank you for having afforded me this opportunity of bringing before this most important Conference a question upon the solution of which I think I may say the future welfare and prosperity of our West Indian Colonies undoubtedly depends.

With your permission, Sir Henry, I will now read this paper, which I think will give, succinctly, some of the most important features of the question:—

“The sugar industry is carried on in several of our Colonies and in India. In some of the West India Colonies and Mauritius it is the main industry, and that by which the bulk of the population is supported. In Queensland and New South Wales it promises to become a large industry, and during the few years prior to 1884 it was increasing rapidly, and would undoubtedly have continued to do so, provided that the natural price of sugar could be permanently secured. In Natal, Fiji, Ceylon, Canada, sugar is produced, and also in India. The known production of our Colonies is about 500,000 tons. The industry is thus a large one, but, what is of more importance, it is capable of almost indefinite expansion. The production of sugar, moreover, is of far greater importance and advantage to those countries in which it is carried on, from an industrial point of view, than is the case with most products of the soil, such as wheat, maize, rice, coffee, tea, cocoa, &c., for the following reason. It is not only an agricultural, but also a manufacturing industry, requiring technical education of a high order for its success. The advantage of this is not only that it provides a profitable field of employment in our Colonies for intelligent, skilled mechanics—an advantage to the working classes of this country of which they are not sufficiently aware—but the fact of such skilled artizans being brought into contact with the ignorant coloured labourers of our tropical possessions is of the highest profit, from an educational point of view to those classes. Those only who have seen the immense improvement which has taken place in the condition of the labouring population, apart from the mere wages question, in those districts of Europe where the sugar industry has of late years been introduced, can realise how important an element this is in the consideration of the sugar question. I therefore think that the sugar industry is one which the Colonies would not be wise to neglect.

“During the last four years the sugar industry has been passing through a crisis of the gravest character. Since the beginning of 1884 the price of sugar has fallen about 40 per cent. This fall has been entirely caused by the enormous increase in the production of beet sugar in Europe, an increase which has been brought about by the large bounties granted by European Governments on the

production of beet sugar in their respective countries. The 'Deutsche Zucker Industrie,' a newspaper devoted to the interests of the German sugar industry, and a thoroughly well-informed journal, recently published an estimate of the amount of the bounties now being granted to the sugar industries of the different European countries. The following are the amounts:—

	£
"Germany.. .. .	1,886,690
France	3,280,000
Austria	1,036,667
Belgium	813,000
Holland	309,000
Total	<hr/> 7,326,012

"Russia is left out of this calculation; but, although at present Russia does not grant bounties, she did last year give a large bounty on the export of sugar, and there is no certainty that she will not again do so. Such bounties, if granted, are not, however, likely to be permanent, and Russia may be left out of the question."

"The total known sugar production of the world is about 5,000,000 tons; of this quantity, about one-half, or 2,500,000 tons, is beet, and of this quantity Russia produces about 500,000 tons, leaving about 2,000,000 tons as the production of the rest of Europe."

"It will thus be seen that the bounties granted amount, on the whole, to about 3*l.* 10*s.* per ton, the value of beet sugar in the English market being about 12*l.* per ton. This large figure of 3*l.* 10*s.* per ton, however, is not granted by all the Governments, but is largely accounted for by the very excessive bounty at present given by France, and which commenced only last year under a new law, evidently passed under misapprehension and ignorance of its effect by the French Legislature, and there seems every probability that the bounty now granted will shortly be reduced."

"Assuming this to be so, and that the bounties are reduced to a figure not exceeding 2*l.* per ton, it will still readily be seen that industries, without any such artificial aid, are placed at a considerable disadvantage, so much so that it is impossible they can assume that healthy development which might be fairly expected if the conditions of competition were alike for all, and it is therefore worthy of serious consideration whether some effort ought not to be made, in the interests of our Colonies, to bring to an end a system which is obviously so injurious to a Colonial industry of considerable importance. And this is by no means so difficult as might at first sight be imagined. The object which the European Governments have had mainly in view in granting these bounties has been to secure access to the English markets, and by means of a large export trade in sugar to this country to increase

the means of employment for their people. England, therefore, has a predominant voice in the matter, and I am convinced that, by judicious action and representation on her part, an agreement might be come to with foreign Governments under which all bounties should be abolished.

“ It has been argued by the press of this country that England profits by the reduced price of sugar caused by the bounties, and that this being so, it was no concern of hers if our Colonies were injured. Now apart from the consideration that it can, I believe, be shown and proved that the indirect loss caused to our working classes through loss of employment owing to the transference of the industry from our Colonies to Europe is fully equal to, and probably exceeds, any advantage arising from the price of sugar being slightly below the natural price, I cannot but think the Representatives of our Colonies would protest against such a doctrine, a doctrine, moreover, which I do not think would meet with acceptance generally in this country, where the sympathy with our Colonies is undoubtedly very strong, and the tendency of political feeling is rather to strengthen the ties which unite the Empire than to relax them.

“ I would also point out that whilst hitherto bounties have been confined to sugar and two or three other minor articles, such as cod-fish, there is nothing to prevent their being granted on other commodities, and hence I think other industries which are equally open to attack are concerned in seeing the system put an end to.

“ I hope, therefore, that the Colonial Representatives will agree in representing to the Government :—

“ 1. That the maintenance of the sugar bounties by European Governments is injurious to a large Colonial industry.

“ 2. That justice to our Colonial industries and trade should be no less an object of our Government than justice to home industries and trade.

“ 3. The hope that Her Majesty's Government will spare no effort to bring about the abolition of a system so destructive of sound and healthy competition.”

I think that in this paper I have run through the leading features of this bounty system, and without enlarging upon it, if there is any information that any of the gentlemen assembled in this Conference desire, I shall be very happy to answer any questions to the best of my ability, but I do not think that I can add very much upon the general principle involved in this sugar bounty question to what I have already read.

(Some diagrams were laid before the Delegates.)

The PRESIDENT. These diagrams have just been sent to the Colonial Office by Mr. W. P. B. Sheppard, of the Temple. I thought you might like to see them. I am told that these diagrams have been prepared by persons who are interested in Barbados.

Before asking any questions of Mr. Lubbock, I would remind the Delegates that a Committee of the House of Commons was appointed to consider the question of sugar industries in the year 1880, and they reported on the 4th August, 1880, and with the leave of the Delegates, I will read their conclusions :—

“Your Committee would sum up their conclusions as follows :—

“1. That the effect of the system of bounties on the exportation of sugar, raw and refined, now in force in various foreign countries, has been injurious both to our home and Colonial sugar industries.

“2. That the effect has been to practically extinguish the loaf sugar refining trade.

“3. That the development of the sugar-growing industry of our Colonies has been checked, and their future prosperity endangered.

“4. That it is expedient that immediate steps be taken to obtain such an alteration in the present systems as will stop the granting of bounties on sugar, both raw and refined.

“5. That the most effectual mode of securing this result is manufacturing and refining under Excise supervision.

“6. That Her Majesty's Government should invite the sugar-producing Powers to a Conference, with a view of arriving at a common understanding for the suppression of bounties on the basis of manufacturing and refining under Excise supervision, the question of equivalents for this system not being precluded from consideration.

“7. That, should the Commercial Treaties to which this country is a party prevent Her Majesty's Government from taking part in an International Convention which provides for common action of defence against countries giving bounties, Her Majesty's Government should, on the renewal of those Treaties, and also in the negotiation of new ones, take into their consideration the propriety of stipulating for such liberty of action as will enable them in the last resort to impose a countervailing duty.”

I will now call upon Sir James Fergusson to inform the Delegates what action has been taken, not perhaps directly upon the Report of the Select Committee, but in conformity with their Report.

Sir JAMES FERGUSSON. I have just sent out for some particulars to the Head of the Commercial Department of the Foreign Office, because my connection with the Foreign Office is so very recent that I cannot from memory say when the Foreign Office was first moved to assist in this matter, and when it began to move. But I can say that, during the last autumn when I have been here, I have been directly concerned in approaching foreign Governments with a view to bring about a Sugar Conference. In the first place, it was thought advisable to ascertain whether the Great Powers who are interested in the matter were

prepared to enter into a Conference before sending a formal Circular to all the Powers. Accordingly, the Governments of Germany, France, and Austria, I think I may say, speaking from memory, were approached with the view of ascertaining whether they were prepared to enter into a Conference. I hope immediately to be able to tell you accurately what has passed; but I may say that several of those Powers have intimated their willingness to confer upon the matter, but desire to be more fully informed of our objects before formally giving their assent.

It may seem, as it did yesterday to some members of the Conference, that we are very slow; but the fact is that the rapidity of our proceedings does not depend upon ourselves. (*Hear, hear.*) Foreign Governments are actuated by one consideration only, and that is what is more to the benefit of their own subjects. (*Hear, hear.*) They grant the bounties because they think they can by those means most profitably compete with us; and naturally they are a little slow to confer with the direct object of doing away with that which they have commenced for their own gain. Therefore, they view with some suspicion our efforts to relieve ourselves of a system which operates against us, just as, when we have adopted an entirely free trade policy, the foreign Governments do not listen to us very readily when we complain of their maintaining protective Tariffs.

The exact footing on which it stands is that we are really doing our very best, because I can say that we have repeatedly addressed these questions, at the risk of getting a rebuff, to induce them to give answers as to entering into a Conference; and as soon as the Great Powers have intimated their readiness to do so, a Circular will be sent to all the Powers interested, directly inviting them.

Mr. Lubbock mentioned just now that Russia this year is not giving any sugar bounty. That is simply because she finds that she has over-done it, and has stimulated production to such an extent that the price of sugar has fallen so low that it does not yield a profit to the manufacturer. Therefore, she has this year not only suspended the granting of bounties, but limited the quantity of the production of sugar. Therefore, these Governments are simply actuated by desire to foster their native products, just as I can remember Colonial Governments offering a premium for the best ton of sugar, or tobacco, or something else manufactured; and I am afraid that self-interest will actuate them in the future as it has done in the past. I hope to have the further information directly.

The PRESIDENT. Would any Delegate like to get any further information from Mr. Lubbock upon the question? Mauritius, of course, is very largely interested in this question, and we have present on this occasion three gentlemen who are representing Mauritius—Sir Henry Barkly, Mr. Jourdain, and Mr. Newton. I

do not know whether they wish to say anything on the part of Mauritius.

Mr. JOURDAIN. I have very little to add to the very able paper which my friend Mr. Lubbock has read, and which treats so comprehensively of the bounty system.

Of course Mauritius is affected very materially by the system of the bounties. You never see in Europe now our best sugar from Mauritius. In fact, the question affects us in this way, that we can only send to Europe now the very lowest classes of sugar which are fit for refining, for our fine products, which otherwise might come here, are absolutely prohibited by the fact that they would have to compete with the bounty-fed article.

Mauritius, perhaps, has not suffered lately in the struggle which the sugar-producing Colonies have had to support to the same extent as many of the West Indian Colonies, because we have, fortunately for Mauritius, a very active demand for our sugar in India. Formerly we had also an active demand in Australia, but now our exports to Australia are not 50 per cent. of what they used to be. We have, however, an increasing demand for India, and although the price of sugar which is obtained in Mauritius is, in point of fact, regulated in a great measure by the price that is obtained in Europe, still, this very favourable demand from India has enabled the Colony of Mauritius to hold up under the depressing circumstances of the past four years better than it could otherwise have done. There is also this fact which has encouraged the Mauritius planter, the fact of our currency being a silver currency. While the expenses of the planter, as regards his wages and his food (which he imports from India), and for his labour, are paid in a silver currency, all the sugar which we ship to Australia and to Europe, and, I am happy to say, now, to the United States of America, is sold at gold prices. Consequently we have had advantages in this way which have enabled the Colony to stand up during the past four years very much better than it otherwise would have done, and better than many of the West Indian Colonies have been able to do. Still, we do feel in Mauritius that we are equally interested with the West Indian Colonies in this question of bounty.

I think that I might be permitted to say that although it is quite true that the result of this bounty system has been to give to the population of Great Britain sugar at lower prices than they would have to pay if these bounties did not exist, still, it is a question, looking at it from a Colonial point of view, whether the British population may not in the end be paying a little too dear for their whistle, and whether the fact that they are getting their sugar now at $\frac{1}{2}$ d. a pound cheaper than they otherwise pay for it is not counterbalanced by the extra responsibilities and liabilities which will fall upon the home country if this melancholy state of affairs

existing in the sugar-producing Colonies is still further intensified. We have to consider not only the colonists themselves, and those who for many years have had their capital invested largely in these Colonies, I think, but we have also, looking at it in the Imperial view, to think of the large labouring populations which the sugar-producing Colonies have introduced for the carrying on of their industry. I allude to the large number of our Indian British subjects who now people not only Mauritius but the West Indian Colonies. If the West Indian Colonies, by the continued fall in the value of their produce, are to be compelled, as some people seem to fear, to give up the sugar industry, I ask you to consider what will be the position of those Colonies, and what will be the position of the Imperial Government with regard to that large amount of imported labour.

I have heard with very great satisfaction that the question of the International Conference has been taken up by Her Majesty's Foreign Office, and trust that that may have some practical effect. I feel, as Sir James Fergusson said just now, that the selfish interests which those foreign countries to which he referred must naturally consult may prevail; but I do think, Sir, that if we in England were to let those countries know that in defence of our fellow-subjects throughout the world, we should find it necessary, sooner or later, to adopt some measure to counteract the bounty system, I do think it would become unnecessary for active measures to be taken. I think it would be sufficient if we were to convince those Governments (I will not say by any official intimation, it is not within my province to dictate as to the mode in which we should convince them) that free traders as we are, we mean to have free trade in the proper and full acceptance of the word.

The PRESIDENT. I think we are travelling rather far from the subject.

Mr. JOURDAIN. I only meant to suggest as a remedy for the state of things which exists in regard to the sugar-producing Colonies, that if by an expression of public opinion here it was known that in the event of the proposal of a Sugar Conference not being conceded by those foreign nations we should feel ourselves obliged to take measures to guard our interests, I think that would be a sufficiently powerful lever to bring them into the Conference.

I thank you, sir, very much for having allowed me the privilege of addressing the Conference, and I shall be very happy indeed, as far as Mauritius is concerned, to answer any questions which may be asked.

Mr. HOFMEYR (Cape of Good Hope). I should like to ask Mr. Lubbock whether the West Indian islands did not at one time make an attempt to get a market for their sugar in the United States.

Mr. LUBBOCK. That is so.

Mr. HOFMEYR. I should also like to ask whether there was

not a draft Treaty drawn up at one time, and what became of that attempt.

Mr. LUBBOCK. There was a Treaty proposed by the United States Government, but it was not accepted by Her Majesty's Government. It was earnestly wished for by the West Indian Colonies; it would have been an immense boon to them, but the Government here refused to approve it, on the ground that it interfered with some ideas which they had always carried out with regard to shipping. I think that was the reason.

Mr. HOFMEYR. Could you briefly state the nature of that draft Treaty?

Mr. LUBBOCK. The nature of the draft treaty was that the United States, on the one hand, agreed to allow the West Indian sugar to come duty free; and the West Indian Colonies, on the other hand, agreed to allow certain products from the United States to come into the West Indian Colonies at lower rates of duty than had hitherto been charged on those products. At the same time, it was not proposed that any lower rates of duty should be charged to the United States than would also be charged in the United States to British goods of similar character. But it was stipulated as part of the Treaty that produce which was to receive advantage of the reduction should be carried in the shipping of one or other of the Contracting Parties, and I think that that was one of the chief causes which led our Government here to refuse assent to the proposal.

Mr. HOFMEYR. Which side would have lost more in customs duties under that arrangement, the United States or the West Indies?

Mr. LUBBOCK. The United States would have lost, roughly speaking, 1,000,000% for every 100,000% that the West Indies would have lost.

Mr. HOFMEYR. The United States would have lost ten times as much as the West Indies?

Mr. LUBBOCK. They would have lost ten times as much.

The PRESIDENT. I have not to defend Her Majesty's present Government, because this question came on before Her Majesty's present Government came into office; but I attended with Mr. Neville Lubbock, and, as he knows, took a great deal of interest about the question of this Treaty. It is fair to mention that there were two points upon which the Government felt unable to assent to the Treaty. One was the point mentioned by Mr. Lubbock—the shipping question; and the second was the point that arises on all these questions, viz., the most-favoured-nation clauses. (*Hear, hear.*) Those two points the late Government did not see their way to get over.

Mr. LUBBOCK. That was so.

The PRESIDENT. The Delegates would be glad to know whether anything is going on now.

Mr. LUBBOCK. I am afraid that the matter has entirely dropped, for no negotiations are going on. With regard to that favoured-nation clause, I should like to add that it is peculiarly hard upon the West Indies that their Treaty should be refused on that ground—for this reason, that the refusal was specially in consequence of this favoured-nation clause in Treaties with those very Governments which are giving these sugar bounties. Hence the West Indies found their sugar shut out in consequence of the action of Germany and Belgium; and when they were offered a most favourable Treaty by the United States, they were told that England had Treaties with Germany and Belgium which prevented that Treaty being allowed.*

Mr. HOFMEYR. Then your case is that, by reason of the bounties paid by France and Germany on sugar, your sugar is practically excluded from the English market?

Mr. LUBBOCK. Quite so.

Mr. HOFMEYR. And if you could arrange with the United States to get a market for your sugar there, you are again defeated by the Treaties with France and Germany.

Mr. LUBBOCK. Yes, except that I ought not to say that our sugars are excluded, but that they cannot be sold in the English market on the same terms to the sellers as the sugars of France and Germany are sold.

Sir ALEXANDER CAMPBELL. Six or seven years ago there was a deputation from the West India Islands to Canada on the subject, with the view of establishing reciprocal trade. I do not think there was any objection introduced on the part of Her Majesty's Government; but the members of the deputation did not desire that this reciprocal free trade should go beyond Jamaica, and are not willing that it should extend to other West India Islands; and I think the negotiations broke off upon that point. I was a member of the Government who saw the gentleman from the West Indies.

Mr. LUBBOCK. I knew that there had been negotiations, but I was not aware that the negotiations had gone to that length. I might explain that what possibly influenced that idea was this: The consumption of sugar in Canada is of course very small as compared with the consumption of sugar in the United States. Hence, if Canada admitted all the sugar from the West Indies duty free it would be no advantage to them; but if she admitted the sugar of Jamaica duty free it would be a great advantage to Jamaica. With regard to the negotiations with foreign Governments, there had been negotiations carried on during the last twenty years, and the last serious negotiations fell through owing

* In the *Sugar Cane* for June, 1885 (page 288), is a letter from Mr. W. P. B. Shephard to the West India Committee, in reply to an enquiry on this question, headed "Convention as to trade between British West Indies and the United States."

to this: Several of the European Governments expressed their willingness to enter into a Convention with our Government under which they would agree to abolish their bounties; but they stipulated that if they were to do so, it would not be fair that some other country outside the Convention should be allowed to continue to send bounty-fed sugar to English markets; and they said, "We will not agree to give up our bounties if we are held open to competition on the part of some other foreign country which will continue to give bounties." They asked, therefore, that the English Government should in Convention provide some remedy for that state of things. The English Government at that time refused to do so, and it was upon that ground that the negotiations fell through. I am quite convinced that in the fresh negotiations which are about to take place the same question is certain to be raised, and it is really the *crux* of the whole sugar question. If our Government could see their way to a Convention in which they would agree that those parties who do abolish their bounties should not be liable to attack in some other country outside, whom it might suit to give bounties with a view of obtaining the trade, I believe that a Convention would be brought about.

Mr. DEAKIN (Victoria). It seems rather hard for the Colonial Representatives to reach any decision in this matter if we stop where this paper stops. There are three propositions here. The Colonial Representatives are asked to agree, first, that the maintenance of sugar bounties by European Governments is injurious to a large Colonial industry. That is patent, and the answer is undoubtedly in the affirmative. Secondly, they are asked to declare that justice to our Colonial industries and trade should be no less an object of our Government than justice to home industries and trade. We hope so. Thirdly, they are asked to express a hope that Her Majesty's Government will spare no effort to bring about the abolition of a system so destructive of sound and healthy competition. As Sir James Fergusson remarked, seeing that we are undoubtedly all together sufferers by the system, and have nothing to gain by its continuance, there is no question, as it seems to me, that we must unite in enforcing these three propositions.

The PRESIDENT. What I was going to suggest was that, if any of the Delegates wish to ask any questions upon this point of Mr. Jourdain or of Mr. Giffen, who has been kind enough to attend from the Board of Trade, and whose name is well known to everybody, they should now do so; and then after that we should ask those gentlemen to retire, and discuss the matter amongst ourselves.

Mr. DEAKIN. There does not seem to be anything to discuss in the Resolutions.

Sir JAMES FERGUSSON. Might I just say, as I spoke just now from recollection on the spur of the moment, that I find I

was perfectly correct in what I stated to the Conference? But as a reference has been made to past negotiations which broke down on certain points, I may say that the matter stands in this way exactly: That the three Great Powers who were sounded as to their willingness to join the Convention have intimated their willingness to consider the question; but they naturally make the condition that the understanding shall extend to all the countries interested, and Germany and Austria ask to have the project of Her Majesty's Government more fully explained to them, which will be done immediately. It was only in September, soon after Lord Salisbury came into office, that the Foreign Office was first moved to approach foreign Powers on this question; and I can repeat with the greatest confidence that not only has no time been lost since in endeavouring to bring this Convention about, but that these Governments have been repeatedly asked for replies; and that accordingly every effort will now be used to induce them to give their preliminary adhesion, and then a Circular will be sent to all the Powers interested to induce them, if possible, to come into the Conference.

The PRESIDENT. You are in fact waiting for some further information from the Colonial Department.

Sir JAMES FERGUSSON. We are waiting for some particulars from the Colonial Department and from the Board of Trade.

The PRESIDENT. Has any gentleman any question to ask of Mr. Lubbock, of Mr. Jourdain, or of Mr. Giffen? If not, we will ask those gentlemen to retire, and then discuss the question so as to give some kind of answer to these questions.

Sir PATRICK JENNINGS. Might I ask Mr. Jourdain one question? In his statement in which he advocated the holding of this Convention, with a desire to influence the nations which now give such large bounties to discontinue them, I think he said at the end, if I am not mistaken, that if that came to nought, if nothing could be done by the Imperial Government to induce these Great Continental Powers who pay such enormous sugar bounties to cease doing so, we should have to resort to other means. Would those other means be the putting on of import duties, because I have heard something about a countervailing duty? I did not know whether that might be implied in the observations which he was good enough to make to the Conference.

Mr. JOURDAIN. I thought I had stated that I did not believe that the imposition of countervailing duties would become necessary. When once foreign countries realize the fact that this would be a last resource, I think that no necessity would arise for the enactment of any countervailing duties. That is to say, that if, when the Conference met, the Delegates from England were able to say, "Well, then, as a last resource, the country, although not wishing it, fears it may after all be forced to enact counter-

vailing duties, and all the bounty-paying countries who will agree to abolish bounties and want protection from other countries which continue the bounty system will find it in England," I think that would be sufficient.

Sir PATRICK JENNINGS. Of course, these countervailing duties, as they are called, would have to be paid by the Colonies; that is to say, upon Colonial sugar imported into England from Queensland, or from New South Wales, or from Mauritius?

The PRESIDENT. That depends upon the way in which the countervailing duty is put on. You put on a countervailing duty against a country which pays bounties. (*Hear, hear.*) But we will not, while these gentlemen are present, discuss that question, because that is for ourselves.

Mr. J. E. TINNÉ. May I be allowed to say, on behalf of British Guiana, that, whether there is a Conference or no Conference, I think that little good will be done unless this country takes power to impose a countervailing duty? Whether the duty is ever put on or not, she must have the power to impose it; otherwise it is like going into battle with our hands tied * I was particularly interested in hearing Sir James Fergusson say that these countries look at the whole question from the point of view of self-interest. It is perfectly true that it is a hopeless task to convince France or Germany that they are giving away cheap sugar to us, and that they are increasing the burden upon their taxpayers. They will not believe it, and we cannot make them believe it. I have recently had some correspondence with a gentleman who once filled, under Her Majesty's late Government, the post of which Sir James Fergusson now fills, and he said, "Your great object must be to persuade the French that they are giving us cheap sugar, and burdening their taxpayers." As I say, that is a perfectly hopeless task. We have such enormous interests to conflict with in the wealth of the refiners of France, and we are under a disadvantage from the absence of public opinion, because the press has not the same power in these countries that it has in our own.

The PRESIDENT. Are you suffering very much in British Guiana in the same way as the other West India Islands?

Mr. TINNÉ. Still more, I think, because in Demerara 98 per cent. of our exports consist of sugar. We have not got cocoa or coffee except to a very trifling extent; and, as I once pointed out to Lord Derby, the whole of our capital is invested in this enormously expensive machinery; and, as Lord Derby recognized, if you give the *quietus* to the sugar industry, we cannot transfer our capital; it is wiped out and extinguished. If the sugar industry is crushed out of Demerara, we cannot change from one cultivation to another. The whole of our plant is rendered useless and our capital is lost.

* Mr. Tinne here hits the nail straight on the head.

Mr. C. WASHINGTON EVES. On behalf of Jamaica, I should like to make a short statement on this question. Jamaica is not entirely dependent upon sugar, for it has other important interests. But it must be remembered that out of a total value of exports of 1,500,000%, in round numbers, the value of the produce of the cane in sugar in the year 1885 was 307,826%, and rum 234,053%, or together more than a third of the total exports. The sugar-cane, therefore, plays a very important part, and in several respects perhaps the most important. Its cultivation and manufacture require large capital, it provides steady work and regular wages to the labouring population, and it keeps together a settled class of skilled and intelligent persons, native or European, which is important for the preservation of healthy social conditions. A bad fruit season, for instance, might reduce a large number of people to distress. But a sugar estate, to be kept in cultivation, must always go on and maintain the necessary expenditure for wages, both of cultivation and manufacture. I think this consideration will be of supreme importance to the Imperial Government, which is mainly responsible for the government of the Colony. Now the sugar production of Jamaica has for many years remained almost stationary, showing an average of less than 30,000 tons during the last ten years. One hundred and fifty years ago (1739) it produced more than this; in 1772 it produced 75,000 tons, and in the first quarter of the present century it reached a considerably greater quantity. Now no Jamaica man would wish to go back to these old times. We want neither slavery in the island nor protection at home. Jamaica has suffered all the hardships consequent upon the commercial policy of the mother country, and we want that policy now to be directed to the removal of those unequal conditions which are produced by the bounty system of European States. Jamaica, with its large population, its rich soil, its abundance of water, would increase its production again to 80,000 or 100,000 tons if it were felt that capital could be securely invested, and that the price of sugar would be regulated by the ordinary laws of the natural cost of production and of supply and demand, without the risk and uncertainty produced by the artificial interference of bounties. I believe a large amount of money could be obtained for that concentration of work involved in what is known as the central factory system—that is, making the best sugar at least cost—but no one will risk his money when the fruits of that enterprise may be suddenly swept away by large bounties on the export of sugar from European countries. The bounty system is bad in itself, and its influence upon our Colonies is most injurious. It keeps Jamaica back from any agricultural progress in the production of an article especially adapted to its soil and climate. It is to the interest of the mother country that this should be remedied. We take half the value

of our imports from the United Kingdom, that is, to the extent of 761,000*l.*, or 25*s.* per head of population, and there is room for great expansion of this trade. Formerly, the bulk of the produce came to England, but in the desperate hope of finding a better market dependent more upon cane sugar than the bounty-fed beet sugar of Europe, we have been driven to send our produce in increasing quantities to the United States. And with regard to the general course of trade, while we export to the United Kingdom only 530,000*l.* of the total value of all exports, we send to the United States 595,000*l.* of the total value, the remainder going to Canada and other countries. In 1885 only 6,000 tons of sugar came to Great Britain, while nearly 16,000 tons went to the United States. I think this point is worthy of serious attention, especially from the point of view of Imperial interests and of keeping the mother country in close bonds both of sentiment and business with the Colonies. I have no particular remedy to propose for the evils of the bounty system. That is a matter for which Her Majesty's Government are responsible. There is no doubt that action should be taken, either by an International Conference or other means (that has all been done) to induce foreign Powers to abolish this bounty system. I join in pressing this upon the attention of the Government. It was a very significant sign when Jamaica wished, with the other West Indian Colonies, to make an exclusive Treaty with the United States. But we all want to continue to look to Great Britain as our true mother country, and if she will only secure for us fair play in the markets of the world, and especially in British markets, there is no country in which the capitalist and the enterprising man could have greater confidence than Jamaica, and the labour of the country, instead of being drained away to miserable work in the Panamá Canal, would be made fruitful and prosperous in its own home. Might I make a few remarks with respect to spirits and rum?

The PRESIDENT. No; I think not. This is a question of sugar bounties.

Mr. C. WASHINGTON EVES. It is simply with reference to the differential duty.

Sir SAMUEL GRIFFITH. I understood Mr. Lubbock to say that he had hopes that the foreign countries would give way on this question of the bounty without any necessity of imposing any countervailing duty in this country. As a matter of curiosity, I should like to know what inducement he thinks could be offered to them to abandon a system which they have introduced entirely for the benefit of their own people.

Mr. LUBBOCK. My own impression is that the answer is this: The amount of bounty given in the different European countries varies, and hence those countries which are not in receipt of the largest bounty are all at a disadvantage compared with the

country which is in receipt of the largest bounty. At the present moment, France is giving a bounty probably equal to £6 a ton, whilst the bounty given by Germany is barely equal to £2. Hence the German sugar-growers are finding themselves at enormous disadvantage compared with France, and they would therefore prefer to see all bounties abolished, rather than remain under a bounty system under which they were receiving £4 per ton less than the French sugar-growers. Hence, I think it will be found, when we come to close quarters, that probably all countries, except France, will be anxious to join in a Convention for the abolition of bounty, assuming always that there is some provision in that Convention against any outside country being allowed to send their sugar free into these markets, and that there may be some difficulty raised on the part of the French industry. I do not think that there will be difficulties on the part of the French Government, because the charge on the French Government is now so enormous that it is very difficult for them to meet it. But, on the other hand, the sugar industry is so powerful in their Legislature that it would be very difficult for the French Government to carry out what I would like to see done.

Mr. TINNE. Might I add that a French newspaper, "La Sucrerie Indigène," not very long ago urged very strongly that measures should be taken to modify or abolish the bounties, because, it said, the sugar industry has no to-morrow, and there is a general feeling of insecurity, even in France, from their not knowing how long these enormous bounties may go on. I think they would much rather have the industry on a sound footing than be bolstered up by a high bounty which may be withdrawn at very short notice.

The PRESIDENT. These are propositions which may be very properly addressed to Her Majesty's Government, and it is a very good thing that Sir James Fergusson has heard them; but they are not really before the Conference, and we had better not go into arguments of that nature. Does any Delegate wish to ask any further questions? If not, gentlemen, I will ask you to retire, but you must remember that what passes in this room is strictly confidential.

(Mr. Lubbock and the gentlemen accompanying him left the room.)

ADELAIDE JUBILEE EXHIBITION.

We have pleasure in announcing that Messrs. Robey & Co., Globe Works, Lincoln, have been awarded Six First Prizes at the Adelaide Exhibition for their Horizontal Automatic Engine, Compound Portable Engine, Portable Winding Engine, Wrought Angle Iron-framed Thrashing Machine, Patent Robey Winding Engine, with Wrought-iron Tank Foundations, and Centrifugal Pumps.

GERMAN SUGAR COMPANIES,

Company.	Sales, &c.	Outlay and Expenses.	Gross Profits.	Written off.	Gratification, Interest, &c.	Cost of Beets.
	Marks.	Marks.	Marks.	Marks.	Marks.	Pfennig.
Wendessen .....	.....	.....	148,718	24,571	6,461	....
Fallersleben	1,367,905	1,155,684	212,221	32,241	....	....
Hünfeld	353,526	.....	18,782	18,078	....	44½
Gross-Düngen .....	.....	.....	73,205	48,909	....	....
Scheune .....	.....	.....	33,350	81,878	46,079	....
Bahnhof-Marien- burg .....	.....	.....	.....	39,605	....	....
Barum	1,432,292	1,246,757	185,535	92,982	7,339	102
Gilbach .....	.....	.....	10,396	20,777	....	103
Opalenitza .....	.....	.....	264,949	119,256	20,522	95
Pelplin .....	.....	.....	175,264	97,835	15,540	....
Kosten	1,513,680	1,372,385	141,295	45,705	....	98½
Bedburg	1,499,425	1,492,708	6,717	89,409	....	89
Bernstadt .....	.....	.....	49,167	11,340	38,743	....
Klein-Wanzleben ..	.....	.....	210,956	75,000	12,156	96
Königslütter .....	.....	.....	33,960	33,960	....	....
Fraustadt	6,562,620	.....	61,490	98,652	....	....
Bennigsen .....	.....	.....	102,195	79,415	....	....
Dettum	935,519	808,692	126,827	16,734	....	....
Neuwerk .....	.....	.....	182,880	54,917	8,760	....

a Raising the amount of the debit balance to M. 270,525, more than half the capital.

b 5% on preference shares (M. 1,000,000) and 2% on ordinary shares. The same dividends were paid last year.

CAMPAIGN 1886-1887.—(Continued from page 571.)

Company.	Net Profit.	Loss.	Carried forward or put to Reserve.	Dividend.	Capital.	
					Shares, &c.	Loan.
	Marks.	Marks.	Marks.		Marks.	Marks.
Wendessen	117,685	....	R. 7,436	33%	367,500	.....
Fallersleben	179,980	....	.....	....	.....	.....
Hünfeld	695	....	.....	....	.....	.....
Gross-Düngen	24,296	....	.....	....	.....	.....
Scheune .....	.....	94,607	.....	....	.....	.....
Bahnhof-Marien- burg .....	.....	a 125,613	.....	....	460,000	.....
Barum	85,214	....	R. 8,174	20%	381,750	.....
Gilbach .....	.....	10,381	.....	....	.....	.....
Opolenitza	108,457	....	R. 16,713	....	.....	.....
Pelplich	59,673	....	{ R. 23,982 F. 5,692 }	5%	600,000	.....
Kosten	95,590	....	.....	....	.....	.....
Bedburg .....	.....	82,692	.....	....	.....	.....
Bernstadt .....	.....	915	.....	....	.....	.....
Klein-Wanzleben ..	123,800	....	R. 39,800	b 5% & 2%	2,700,000	.....
Königslütter .....	.....	....	.....	....	.....	.....
Fraustadt .....	.....	37,162	.....	....	.....	.....
Bennigsen	22,780	....	.....	4%	.....	.....
Detum	110,093	....	.....	....	300,000	.....
Neuwerk	c 119,203	....	.....	....	.....	.....

c Applied in the reduction of the debit balance M. 599,714, brought over from last year.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., F.C.S., M.I.M.E.,
Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street,
Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

13955. S. FISKE, London. *Improvements in apparatus or devices for the treatment of sugar cane.* (Complete specification.) 14th October, 1887.

14009. A. J. BOULT, London. (Communicated by L. Bon, Cuba.) *Improvements in machinery for cutting sugar cane.* 15th October, 1887.

14164. G. FLETCHER, London. *Improvements in the evaporation and concentration of sugar-cane juice and other liquids and apparatus therefor.* 18th October, 1887.

14169. J. J. HICKS, London. *Improvements in hydrometers and saccharometers.* 18th October, 1887.

14500. A. STEVENSON, Chester. *Improvements in grinding or pulverising sugar, salt, and other like material, and in apparatus or machinery.* 25th October, 1887.

14804. B. E. R. NEWLANDS, London. *Improvements in means or apparatus for drying slabs of sugar, applicable for heating and cooling other articles, and for analogous operations.* 31st October, 1887.

14883 and 14884. A. BRIN and L. Q. BRIN, London. *Improvements in the treatment of saccharine and sacchariferous matters for the purpose of discolouring, purifying, or refining them.* 1st November, 1887.

AMERICAN.

ABRIDGMENTS.

369844. M. L. E. DUVAL, Paris. *Diffusing apparatus.* September 13th, 1887. This invention consists in the combination with a colander-like diffusion vessel, of a movable double bottom or trap, and means of opening the said bottom or trap for the removal from the interior of the vessel of the spent cane or bagasse after its treatment therein.

369845. M. L. E. DUVAL, Paris. *Mechanical device for shutting the doors of diffusing apparatus.* September 13th, 1887. The object of this invention is to facilitate the closing and fastening of the movable bottoms or discharge gates of diffusing apparatus, and is

especially applicable to cylindro conical, cylindrical, and conical diffusers of great capacity for the treatment of beet root, sugar cane, bagasse, and other matters. It cannot be intelligibly described without drawings.

370057. F. C. HERSEY and H. D. WINTON, of Wellesley Mass, U.S.A. *Machine for packing cube sugar in boxes.* September 20th, 1887. This machine is fitted with a stationary holder for the cube holding plate for holding the cubes of sugar, a collector bar hinged at its ends to supports, moveable vertically at will of operator. This bar collects the cubes of each layer in succession on the plate shoving them into position. When marshalled in order they are transferred to the box and a fresh layer collected.

371528. M. SWENSON, Kansas, U.S.A. *Manufacture of sugar.* October 11, 1887. This invention consists in the addition of powdered chalk to the cane chips in the diffusion process to prevent inversion of the sugar.

372030. O. H. KRAUSE, Jersey City, New Jersey. *Process of manufacturing double-crystallized sugar.* October 25th, 1887. The inventor causes a slab or body of soft or granulated sugar to absorb or be charged with a cold super-saturated aqueous solution of sugar prepared by first making a saturated solution of sugar in water at a relatively high temperature, and then cools down said saturated solution to such temperatue as is sufficient to transform it into the required super-saturated condition preparatory to its immediate use as a charging-liquor.

GERMAN.

ABRIDGMENTS.

33845. J. KASALOVSKY, Prague. *Osmose apparatus, with formation of counter current.* 28th January, 1885. The main canals of the frame of the osmose apparatus are closed by vegetable paper without holes, or by boards in such a manner that every time several frames form a system for the flow of both liquids, molasses, and water in the same direction. These systems are connected again according to the counter-current principle.

39957. L. WULFF, Gadebusch, Mecklenburg. *Crystallising process and apparatus especially designed for sugar.* 16th May, 1886. Additional improvement to Patent 33190, dated 6th November, 1884. The following alterations have been made to the process protected by the main patent:—1. The warm crystals that were added are

replaced by crystallised filling mass. 2. A part of ready-made liquid sugar stuff is drawn into a reservoir standing against the vacuum (vacuum pan) to be added to another liquid sugar stuff, and for the purpose of continuous evaporation on grain (crystal) $\frac{1}{2}$ or $\frac{1}{4}$ of the liquid sugar stuff of the filling mass left in the vacuum apparatus, and fresh juice added to it. 3. For continuous crystallisation of the juice boiled in vacuo without crystallisation, a part of the crystallised sugar is left in the juice reservoir after the crystallisation has taken place, and new juice added to it. (Claim 11.) 4. The juices boiled in vacuo without crystallization are mixed in a larger crystallising apparatus with additional masses, and crystallised partly under high temperature, and cooled, and thoroughly crystallised afterwards in smaller crystallising apparatus. 5. The cooling crystallisers with stirring devices (claims 2, 4, and 5) are formed either as a column of chambers, consisting of a cylinder, which is divided by horizontal diaphragms into several chambers, each of which is provided with stirring arms, or as a column of basins, consisting of several basins placed one over the other, each of which is provided likewise with stirring arms. The columns can also be multiple, consisting of several chamber or basin columns placed one against the other, the basins of which communicate together. 6. Instead of the cooling crystalliser with multiple chamber (claim 4) one with concentrical disposition of the chambers, through which the solution flows alternately from above or below. 7. The cooling crystalliser with multiple chambers with stirring device (claim 4) receives circular diaphragms fixed on the shaft of the stirring apparatus. 8. In the cooling crystallisers (claims 1, 2, 4, and 5) deep hollows are provided perpendicularly to the axis. 9. The cooling crystallisers are introduced in rotation (claims 1, 2, 5, and 8) into air boxes or into water reservoirs, the water of which compensates completely or partly the weight of the apparatus, the same water being used at the same time, as cooling return circulating current in multiple chamber apparatus, single or in series. 10. The rotating apparatus (claim 1) is divided into several chambers not communicating with each other by means of diaphragms perpendicular to the axis. 11. The rotating crystallisers (claims 1, 2, 5, 8) are divided into several parts by dividing walls placed along the height of the shaft. 12. They are fixed to the sides by means of bands. 13. The dissolution compartment of the rotating crystalliser (claim 8) communicate with several crystallising

chambers round the axis. 14. With crystallising chambers on both sides. 15. Instead of the crystalliser with stirring device (claim 7) an apparatus with concentric disposition of the chambers, consisting of a dissolution chamber and several annular crystallising chambers.

34172. L. HARPERATH, Ostend, Belgium. *Removal of sugar from molasses by means of lime and magnesia.* 25th March, 1884. The molasses is thinned by means of water until the amount of sugar becomes 8 per cent., and then mixed with 32·7 parts of lime and 11·7 parts of magnesia, or instead of this, burnt dolomite having this composition, is used. The whole sugar becomes thereby precipitated as saccharate of lime and magnesia without it being necessary to resort to cooling, as in the so called separation process.

34033. F. SCHEIBLER, Burtscheid, Aachen. *Improvements in elastic moulding boxes for rectangular blocks of sugar.* 25th December, 1884. The lateral parts of the square moulding box are stiffened by bossed plates and stay bolts. The easily removable closure of the box is effected by a closing screw, which is fixed in a narrow opening in the side walls, and is drawn on one side by a nut. The bottom plate, which is provided with filling openings, is pushed in a slot under the closing screw; during the centrifugal action these openings are covered by a thin plate tightly screwed. After the removal of the closing screw, the mould can be bent and removed without difficulty from the finished sugar blocks already covered.

33241. C. L. STRUBE, Buckau-Magdeburg. *Stone receiver for beet root washing machine.* 19th June, 1885. This stone containing appliance consists of a short drum provided with a running crown moving on rollers. The inside of the drum is provided with shelves or tanks made of perforated plate or the like. In order to remove the stones which accumulate at the beginning of and during the washing process in the shelves, the drum is turned until the shelves come up to the edge of the washing trough. The stones are removed through trap doors applied on the outer periphery of the drum.

34238. W. LAUKE, Trendelbusch, and W. BUCH, Hanover. *Feeding apparatus for slicing presses.* 23rd April, 1885. A funnel shaped feeding trough can turn on the conical end of a feed pipe, and is provided at its lower end with a bevel wheel, which is connected with a feeding archimedean screw working within the above funnel, the motion being derived from a pulley on the shaft of the archimedean screw. The slices of beet root which fall in the feeding

trough are carried by the slow rotary motion of the same towards the archimedean feeding screw, which conveys them into the pipe connected with the press; this pipe takes also the thrust of the shaft of the archimedean screw. In the conical end of the pipe there is a cone whose corrugated surface throws the beet root slices uniformly against the walls of the conical end of the feed pipe.

34505. C. E. NONCEAUX, Béville-le-Comte. *A process for extracting sugar juices by diffusion at different temperatures.* 9th August, 1885. The slices of beet root are lixiviated in the diffusion battery first at a temperature of 45° to 50° to extract the salts, whereupon the juice containing salts are let out through special emptying openings. The slices are thus lixiviated at a temperature of 70° to 80° to extract the sugar. According to the indications of the inventor the intended separation of the salts of the juice from the sugar is almost complete.

34608. R. ENGLERT and F. BECKER, of Prague. *A process for purifying sugar juices by means of sulphite of protoxide of iron.* 12th March, 1885. The sugar juices saturated to an alkalinity of 0.03 to 0.04 are treated in the boiling state with as much protoxide of iron as is necessary to reduce the alkalinity to about 0.01. The precipitate formed is filtered in filter presses in a state of heat as high as possible. Instead of this iron salt the inventor proposes also to employ salts of alumina.

34680. L. J. PIROTTE, Brussels. *Carbonic acid injector for saturators.* 15th September, 1885. This injector, which replaces the circular and perforated pipe used for the introduction of carbonic acid in the saturating vessels, consists of two halves of circular piping having between them a narrow opening through which the carbonic acid comes out. For the same purpose the lower pipe half is provided besides with openings.

34666. E. HEFFTER, Altjauer, near Jauer, Silesia. *Device for removing the covering of mud and foam from sugar juices and fluids of all kinds.* 30th June, 1885. This device, which is employed in the preliminary sorting (Vorscheidung) of the sugar juices, consists of two sifting plates hanging down on hinges inside a square saturating pan, and of chains passing over rollers, by means of which the plates under the cover of mud are raised, so that they form a horizontal surface, from which the mud is removed by means of a rake, through

a side flap door on the edge of the vessel, under a continual stream of water.

34975. C. BERGER, Herdain, near Breslau. *Using coked residues as discolouring and disinfecting means.* 23rd September, 1885. Five parts of finely ground coke embers are heated to a red heat with two parts of phosphate of calcium in a rotary drum and afterwards allowed to cool down in contact with the ambient air. The resulting powder which is equal to animal black has shown a high discolouring and disinfecting powder when tried with excrements, ink, and sugar carbonised by sulphuric acid.

35487. O. FOLLENIUS, Hattersheim, near Frankfort-on-the-Main. *A process for the production of inverted sugar by pulverising a sugar solution in, and by means of carbonic acid.* 1st October, 1885. The solution of cane sugar is injected in the form of a drizzling cloud into a vessel by means of an injector or pulverizer (Dissipateur) which is set in action by carbonic acid having at least a pressure of 60lbs. per square inch. The vessel is filled up with carbonic acid at a pressure of 3 to 7lbs. per square inch. The inverted sugar formed is precipitated in this process in the form of a colourless powder having the taste of caramel.

35116. F. C. GLASER, Berlin. *Prismatic vessel for the crystallization of sugar candy.* 10th October, 1885. This crystallizing vessel is very high in proportion to its width, so that as little crust as possible should be left at the bottom. The crystallization threads are stretched vertically because it has been remarked that in this case the formation of crusts on the side walls does not take place. In this manner the quantity of crystal crust, which possesses a less commercial value than the strips of crystals formed on the threads, is greatly diminished. The vessel possesses a removable bottom plate fixed by screws, a lid provided with numerous filling holes, and sideways a manhole.

35676. C. UHL & Co., Brunswick. *Process for the precipitation of sugar lime by ammonia.* 21st November, 1885. If ammonia in excess is added in such a quantity to a solution of sugar saturated as far as possible by the substitution process with a powder of caustic lime, that the said solution contains 10 to 15 per cent. ammonia, a precipitate of sugar lime is formed containing 1 molecule sugar to from 2 to 3 molecules lime. The ammonia is introduced in the form of gas, and recuperated from the precipitated lye by heating the latter.

35456. A. HERBST, of the sugar manufactory of Sokolniki, Moscow.

Improvements in the process and apparatus for the manufacture of quadrangular and square bars of sugar, also known as plates, &c. 9th April, 1884. The enclosures for sugar moulds are found now with plates bent in the form of zig-zags and provided with conical teeth arranged alternately. The inclined faces of the plates and teeth are so fitted that the spaces left between them are rectangular. The teeth are made conical for the purpose of removing easily the bars of sugar from the moulds. Another manner of forming the enclosures consists of long strips of plates fastened to an elastic metallic band and held in position during the liquoring process by introducing them in the slots of a cross strip of metal, these metallic bands can be emptied by bending them out of the cross piece. The enclosures of sugar moulds can also be made of one single band of metal bent to the proper shape and double bent at the place where the cross piece would otherwise be. The clearing apparatus protected by patent of addition 32017 is now adapted for sugar loaves, it having received a lateral canal to remove the wider part of the loaf and a different piping.

35457. A. HERBST, of the sugar factory Sokolniki, Moscow.

Improvements in the process and apparatus for the preparation of quadrangular and square bars of sugar, also known as plates. 16th March, 1885. The improvement relates to the impregnation of sugar blocks with cleare in a clearing box, in which a vacuum has been erected before introducing the liquor for the purpose of removing the air from the pores of the sugar. In order to insure that the cleare should penetrate through the sugar only from one side, namely, in the same direction as that in which the green syrup escaped during the centrifugal action, each pair of moulds are laid directly on each other or separated by sieve plates in such a manner that the sides lying together are protected against the penetration of the cleare.

34930. P. VON HERTLING, Berlin. *Improvements in the process and contrivances for the preparation of blocks of sugar of regular form in centrifugals under application of steam (Dampdyke).* 9th July, 1885. The sugar moulds consist in this process of three plates having spring joints at the angles where they are connected together, and of a lid plate pressed against the sugar block by means of a screw. This screw draws at the same time the sides of the mould, which are connected with it by means of a nut and pull bars. In the clearing process, by means of the centrifugal, the back part of the mould receives a heavy perforated plate, which the action of the centrifugal

power causes to press against the block of sugar, and to impart to it thereby an even, smooth, inner surface. Moreover, a curved plate surrounds the frame at the back part with its borders in such a manner that there remain between these and the side of the frame only a slit through which the steam used to clear the sugar is forced to penetrate into the sugar mould in a centripetal direction. Through this the steam is drained of its water completely, as the centrifugal force drives outside the drops of water.

35908. F. HAPRAVIL and F. HERLES, Swolenowes, Bohemia. *Cleaning and softening in hot sugar solutions the tissues employed in the manufacture of sugar.* The filtering tissues of the filter presses contain lime (or other alkaline earths) and saccharate of lime. In the present process these substances are removed completely by washing the tissues in a hot solution of sugar, which does not attack them much. Up to the present time these tissues were washed with water and acids, and the saccharate adhering to them was lost. By this new method sugar manufacturers effect a saving in the extraction of sugar from molasses.

BELGIAN.

ABRIDGMENTS.

68473. J. KROOG, Brussels. *Improvements in double frames for filter presses.* 10th April, 1885. In order to manufacture very thin cakes in filter presses, the frame now in use is provided with an inside fixed partition, which divides the cake compartment into two symmetrical parts, so that two cakes are formed in the same frame. The thickness of the said partition must of course correspond to that of the cakes.

68503. E. M. J. B. ETIENNE, Brussels. *Improvements in sugar moulds.* 7th February, 1885. A swan-necked pipe turned upwards to a certain height is adapted to the collecting blow-off hole, so that a perfect clarification is obtained in parallel layers.

68512. E. DUFAY, Brussels. *Process for a methodical draining of filter press cakes.* 14th April, 1885. This process consists of the following manipulations:—1st. The charging of the filter press is suspended before it is completely filled up, and juice obtained in a previous operation is introduced into it under pressure, so that a stronger juice fit to return to the manufacture is obtained. 2nd. The charging of the filter press is completed with a liquid obtained in mixing hot water with inactive pulverulent matters, or better, with a

small part of cake drained off in the previous operations, and diluted in a pug mill, in order to prevent a choking of the pipes.

68529. C. REUTHER, Brussels. *Improvements in filters*. 15th April, 1885. In this system of filters, prismatic bars having a triangular section are used to form the grates of filters, so that never more than one edge is used to support the filtering tissue.

68535. C. DUPREZ, Brussels. *Draining beetroot pulp by means of filter presses*. 16th April, 1885. The object of this invention is a method of draining beet pulps by means of filter presses, the washing being methodical, general, and not divided into separate filter press elements. The patentee claims also the addition to the pulp of a certain quantity of lime, either in the form of lime milk or in the form of saccharate of lime, or lastly, in the form of bisulphide of lime.

68557. H. VIVIEN AND P. LEVIANDIER, Tournay. *Annular multiple effect filter, with proportional filtering surfaces*. This filter comprises: 1st. Annular compartments with curved filtering surfaces. 2nd. The use of filtering surfaces proportional to the quantities of matters to be retained successively at each filtration. 3rd. Special arrangements permitting the washing of filtering tissues in the filter itself.

68748. G. FLETCHER AND W. P. ABELL, Brussels. *Centrifugals for drying sugar*. This invention consists in an improved centrifugal apparatus applicable to the drying of granular or crystalline matters, permitting constant feeding of the cooked mass, which is introduced methodically in the apparatus, wherein the elements are separated from the liquid parts, the grains or crystals coming out at one place, and the liquids or syrups at another. This is obtained by letting the cooked mass pass continually from the crushing machine into a basket or separator turning rapidly, and provided with arms of metallic gauze, extending spirally to the centre, and forming angles with the radii, whilst other arms equally spiral, but not perforated, form, by being joined to the former, external spaces or compartments.

68749. G. FLETCHER, Brussels. *Improvements in centrifugal apparatus*. 4th May, 1885. The inventor claims: 1st. The application to centrifugal apparatus, of a central shaft fixed to the drum or basket by elastic or other bearings, springs, or arrangements combining both means. 2nd. The application to a centrifugal apparatus of a drum or basket fixed to the central shafts by means of elastic

supports, of rolled up springs spherical or hemispherical bearings, or any other appropriate arrangement.

68951. L. LEFRANC, Brussels. *Improved method of extracting sugar from juices, syrups, &c.* 20th May, 1885. The inventor claims:—1. A process for extracting sugar from the juices, syrups, and molasses of sugar manufactories, sugar refineries, and saccharate manufactories, which is characterised by the combination of the following successive operations:—(a) A sugar solution containing from 5 to 10 per cent. of sugar is treated with lime milk and quick lime, so that a soluble saccharate of lime is obtained; the mixture is filtered to separate the excess of lime, and heated to 100 degrees Centigrade; the lime previously filtered is reinstated, and the mixture filtered again; the tribasic saccharate of lime thus formed is ultimately washed and treated. (b) The mother lyes resulting from the previous operations are, after cooling, treated with quick lime; filtered to separate the excess of lime; a salt of lime, preferably chloride of calcium, is added to the liquid in sufficient quantities to form tribasic saccharate of lime; addition of an alkaline or alkaline earthy base, preferably caustic soda; filtration and ultimate washing and treatment of the tribasic saccharate of lime. 2. The inventor claims also the treatment of sugar solutions with lime milk and quick lime, to avoid an overheating of the liquids, this being injurious to the formation of the bibasic saccharate of lime. He claims, likewise, the reinstatement of the lime in the sugar liquors, after the bibasic saccharate has been transformed into tribasic, under the influence of heat; the purpose of this operation being to avoid losses of sugar and facilitate the filtration of liquids.

68986. A. DUMEZ, Peruwelz. *Improved hand rasp press to rasp beet roots.* 23rd May, 1885. This rasp press is erected on a wooden frame. A shaft provided with a crank, and resting on two pedestals, carries an endless screw, a disengaging gear, a gear of toothed wheels, and a fly wheel. The screw and the toothed gear are loose; the disengaging gear is fixed on the shaft by means of a fixed key, and can throw into gear either the toothed gear or the screw. This disengaging gear is put into gear by a lever.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO OCTOBER 31ST, 1886 AND 1887.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1886.	1887.	1886.	1887.
	Cwts.	Cwts.	£	£
Germany	4,392,604	5,662,666	2,700,864	3,155,451
Holland	239,855	333,799	152,716	180,492
Belgium	541,142	648,818	337,821	351,267
France	32,537	49,266	20,556	28,400
British West Indies & Guiana	1,693,374	1,950,247	1,334,341	1,368,295
British East Indies	653,139	564,366	336,593	262,029
China and Hong Kong	48,257	312	28,005	201
Mauritius	238,109	104,133	154,007	56,995
Spanish West India Islands	21,409	174,758	15,459	108,130
Brazil	470,493	720,714	309,005	384,171
Java	3,772,556	2,927,415	2,762,025	1,886,879
Philippine Islands	453,080	386,634	232,262	174,730
Peru	400,832	339,167	290,459	206,325
Other Countries	510,047	491,092	363,663	277,310
Total of Raw Sugars ..	13,467,434	14,353,387	9,037,776	8,440,675
Molasses	—	—	—	—
Total Raw Sugars	—	—	—	—
REFINED SUGARS.				
Germany	1,409,656	2,069,144	1,172,691	1,574,410
Holland	983,278	1,201,809	849,390	929,316
Belgium	93,708	169,422	86,173	140,319
France	601,283	1,183,608	522,881	890,543
United States	1,251,641	777,111	1,086,977	622,965
Other Countries	821,438	101,029	672,411	72,178
Total of Refined	5,161,004	5,402,123	4,390,523	4,229,731

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	124,834	95,101	84,228	54,344
Belgium	43,732	34,067	30,672	20,751
France	37,243	29,484	28,006	18,431
Portugal, Azores, & Madeira	77,162	69,272	54,938	41,019
Italy	114,925	80,950	79,938	51,994
British North America	16,791	27,941	12,649	19,911
Other Countries	308,685	255,405	235,279	175,547
Total	723,372	592,220	525,710	381,997

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of October compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1884, 1885, and 1886, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"LUMPS AND LOAVES."						"OTHER SORTS," Including Crushed Loaf, Granulated, Crystallized, &c.						TOTAL.					
	Monthly Average.			Oct.	Oct.	Oct.	Monthly Average.			Oct.	Oct.	Oct.	Monthly Average.			Oct.	Oct.	Oct.
	1884	1885	1886	1887	1888	1889	1884	1885	1886	1887	1888	1889	1884	1885	1886	1887	1888	1889
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France.....	2737	2035	1462	1382	653	2417	1621	540	2638	4534	233	4665	4358	2581	4150	5916	7082	3460
Holland	3580	4247	3508	3785	3505	4259	1948	1555	1428	2222	736	1507	5528	5802	4936	6007	5766	7362
Germany & Austria ..	552	956	990	1346	269	758	2380	2859	6634	8998	1041	6822	2932	3815	7624	10344	7580	8412
Belgium	183	214	344	571	55	474	151	116	113	273	81	122	334	330	457	844	596	940
United States	962	722	854	546	92	1111	3386	10654	5078	3337	334	8076	4348	11376	5932	3883	9187	167
Russia .....	..	..	..	3	..	..	..	..	3412	458	..	..	..	..	3412	461	..	1127
Other Countries .....	..	..	..	..	1	..	121	12	9	..	11	..	121	12	9	..	12	..
Total	8014	8174	7158	7633	4580	9019	9607	15742	19362	19822	2436	21192	17621	23916	26520	27455	30211	21468

SUGAR STATISTICS—GREAT BRITAIN.

TO NOVEMBER 19TH, 1886 AND 1887. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1887.	1886.	1887.	1886.	1887.	1886.
London	48	74	281	286	252	269
Liverpool ..	82	82	240	229	245	213
Bristol	3	5	52	52	52	49
Clyde	33	36	207	211	205	181
Total ..	166	197	780	777	754	712
	Decrease.. 31		Increase.. 3		Increase.. 42	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. TO OCTOBER, 1887 AND 1886.

	STOCKS.		DELIVERIES.		IMPORTS.	
	November 1st.		In October.		In October.	
	1887.	1886.	1887.	1886.	1887.	1886.
New York	60	101	76	59	39	38
Boston	12	18	18	12	15	21
Philadelphia....	—	2	7	8	5	5
Baltimore .....	..	..	..	..	..	..
Total	72	121	101	79	59	64
	Decrease .. 49		Increase .. 22		Decrease .. 5	
Total for the Year	—	—	1025	960	994	1024

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, November 17th, 1887.

FAIR REFINING.	96o/o CENTS.	GRANU- LATED.	STAND. A.	STOCK IN FOUR PORTS.
Nov. 17, 1887.—5 3-16c.	6c.	6½ 11-16c.	6 5-16c.	Jan. 1, 1887—102,279 tons.
Nov. 18, 1886.—4½c.	5½c.	5 11-16c.	5½c.	Jan. 1, 1886— 57,328 tons.
Nov. 19, 1885.—5½c.	6c.	6½c.	6 3-16c.	Jan. 1, 1885— 89,186 tons.
Nov. 20, 1884.—5c.	5½c.	6 1-16c.	5 11-16c.	Jan. 1, 1884— 60,900 tons.
Nov. 22, 1883.—6½c.	7 7-16c.	8 1-16c.	7 9-16c.	Jan. 1, 1883— 50,297 tons.
Nov. 23, 1882.—7½c.	7 15-16c.	8½c.	8½c.	Jan. 1, 1882— 43,927 tons.
Nov. 24, 1881.—8c.	8 9-16c.	9½c.	9½c.	Jan. 1, 1881— 66,099 tons.
Nov. 18, 1880.—7½c.	8½c.	9½c.	9½-¾c.	Jan. 1, 1880— 63,558 tons.
Nov. 20, 1879.—9c.	9½c.	10½c.	10½c.	Jan. 1, 1879— 50,773 tons.
Nov. 21, 1878.—7c.	7½c.	9c.	8¾-¾c.	Jan. 1, 1878— 48,230 tons.
Nov. 22, 1877.—7½c.	8 3-16c.	9½c.	9¼-¾c.	Jan. 1, 1877— 25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE
31ST OCTOBER, FOR THREE YEARS, IN THOUSANDS
OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
174	95	21	179	170	18	655	665	654

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING
31ST OCTOBER, IN THOUSANDS OF TONS, TO THE
NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal entrepôts.	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
1206	437	42	421	218	333	2657	2542	2610

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE
FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP,
OF THE THREE PREVIOUS CAMPAIGNS.

(From *Licht's Monthly Circular*.)

	1887-88.	1886-87.	1885-86.	1884-85.
	Tons.	Tons.	Tons.	Tons.
France.....	525,000 ..	488,299 ..	298,407 ..	308,410
German Empire ..	950,000 ..	997,962 ..	838,131 ..	1,154,817
Austro-Hungary..	425,000 ..	523,061 ..	377,032 ..	557,766
Russia and Poland.	400,000 ..	475,000 ..	537,860 ..	386,433
Belgium	100,000 ..	91,120 ..	48,421 ..	88,463
Holland and other Countries	50,000 ..	50,000 ..	37,500 ..	50,000
Total.....	2,450,000	2,625,442	2,137,351	2,545,889

Mr. Licht's present figures are precisely the same as those given last month. The estimate for France is put down at 525,000, which is considerably in excess of other estimates, which range from 390,000 tons to 425,000 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

There has been a good sound business done in sugar of all kinds during November, and prices have advanced from 1s. to 2s. per cwt. except for Low East India, which are 6d. to 9d. higher.

The market for raws at the close of the month became rather excited, the present prospects of the French crop indicating, according to Mr. Licht, a reduction of 50,000 to 75,000 tons, upon his estimates of ten days ago.

The price of German beet, 88% f.o.b., is 14s. 3d. prompt, and 14s. 6d., and 14s. 10½d., according to position.

The outlook for our sugar-growers is more cheering than it has been for a long time.

The imports of foreign refined in October show an increase upon September, of 2,884 tons.

The deliveries into the United Kingdom of raw sugars up to the 19th November show an increase of 2,594 tons, and the imports of 41,804 tons, as compared with 1886.

The stocks in the United Kingdom, on 19th November, were 165,421 tons, against 196,949 tons, for 1886, or a decrease of 31,528.

Present quotations for the standard qualities, as under, are:—

FLOATING.		Last Month.
Porto Rico, fair to good Refining	13/6 to 14/-	against 12/6 to 13/-.
Cuba Centrifugals, 96% polarization	15/6	„ 13/6 to 14/-.
Cuba Muscovados, fair to good Refining..	13/6 to 14/-	„ 12/6 to 13/-.
Java, No. 14 to 15, good to strong	16/3 to 16/6	„ 14/6 to 15/-.
LANDED.		Last Month.
Madras Cane Jaggery	10/- to 10/6	against 9/3 to 9/9.
Manilla Cebu and Ilo Ilo	9/6 to 10/-	„ 9/- to 9/6.
Paris Loaves, f.o.b.	17/6 to 18/-	„ 15/6 to 15/9.
Titlers	19/3	„ 17/9
Tate's Cubes.. .. .	21/3	„ 20/-
Austrian-German Beetroot, 88% f.o.b. ..	14/3	„ 12/6.

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